**3GPP TSG-S4 Meeting MBS ad hoc post #133-e*****S4aI250151***

**Electronic, Online, 3rd–5th September 2025** revision of S4-251227

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.510** | **CR** | **0032** | **rev** | **1** | **Current version:** | **18.4.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | BBC, Qualcomm Incorporated, Samsung, Huawei[, Dolby, Nokia, Lenova, InterDigital Communications] | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AMD\_PRO-MED, 5G\_RTP\_Ph2 | | | | |  | ***Date:*** | | | 2025-09-04 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Satisfy the objectives of the cited Work Items. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | **CR0008 [S4-251463]: “[AMD\_PRO-MED] WT9: Network slicing”**   * Changes to Policy Template data model.   **CR0016 [S4aI250158]: “[AMD\_PRO-MED] WT2: Technology-independent feature updates to enable media delivery from multiple service locations”**   * Modifications to Content Hosting/Publishing Configuration to support multiple service locations, including service chaining at reference point M10.   **CR0020 [S4-251552]: “[AMD\_PRO-MED] WT8: Improved QoS Support for Media Streaming services”**   * Integrate ECN marking for L4S into the procedures for both 5GMSd and 5GMSu. * Integrate the QoS monitoring feature into the procedures for both 5GMSd and 5GMSu. * Support other relevant aspects resulting from stage 2.   **CR0021 [S4-251463]: “[AMD\_PRO-MED] WT1: JSON-based metrics reporting syntax and MIME type registration”**   * Generic JSON-based document syntax for reporting of CMCD information by the 5GMS AS to the 5GMS AF at reference point M3. * IANA registration of MIME media type for the above. * Addition of content identifier to createMediaDeliverySession() method at reference point M6/M11 and internal data model of the Media Session Handler for use in both consumption reporting and metrics reporting of client data.   **CR0031 [S4aI250138]: “[AMD\_PRO-MED, 5G\_RTP\_Ph2] Updated QoS mapping figures”**  Additional mappings for:   |  |  |  | | --- | --- | --- | | Feature | Provisioning (M1) | Session handling (M5/M3) | | ECN marking for L4S | *PolicyTemplate* | *ClientPolicySpecification, DynamicPolicy* | | QoS monitoring | | Dynamically changing traffic characteristics | | | | Downlink data burst | *PolicyConstraints* |  | | Expedited data transfer | *ClientPolicySpecification* | | Multiplexed media data |  | *ApplicationFlowDescription* |   **CR0034 [S4aR250168]: “[5G\_RTP\_Ph2] Enabling RTC support for dynamic traffic characteristics and multiplexed media identification”**  Support for:   * N6-unmarked PDUs. * Dynamic traffic characteristics (data burst size, time to next burst and expedited transfer indication). * Media identification and multiplexing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Objectives of the Work Items are not satisfied. | | | | | | | | |
| ***Q*** | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.3, 5.2.1, 5.2.3.1, 5.2.3.2, 5.2.3.3, 5.2.5.1, 5.2.7.1, 5.2.8.2, 5.2.8.6, 5.2.9.2, 5.3.2.1, 5.3.3.2, 5.3.5.1, 5.3.5.2, 5.4.3, 5.5.3.3.3 (new), 5.5.3.3.4 (new), 5.5.3.3A (new), 5.5.3.4, 7.3.3.2, 7.3.3.4, 7.3.3.6, 8.3.3.1, 8.3.3.2, 8.7.3.1, 8.8.3.1, 8.9.3.1, 9.2.3.1, 9.3.3.1, 9.5.3, 9.5.3.1 (new), 9.5.3.2 (new), 9.6.3.2, 10.2.3, 11.2.2.1, 11.2.3, 11.3.1.2, 11.3.2, A.1, D.1.2, D.1.3, E (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **Y** |  | Other core specifications | | | | TS 26.512 CR0097 | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | CR0032 [S4-251227]: Submitted for WG endorsement.  CR0032r1 [S4aI250151]: Submitted for SWG agreement. | | | | | | | | |

Code changes: Network slicing

The code changes associated with this Change Request are available for review at the following URL on 3GPP Forge:

<https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge_requests/2>

<https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge_requests/2/diffs?commit_id=3664f49a8b0c5594603f9f46904b018eaef26be6>

The proposed changes are reproduced below for posterity.

TS26510\_Maf\_Provisioning\_PolicyTemplates.yaml

|  |
| --- |
| ---a/TS26510\_Maf\_Provisioning\_PolicyTemplates.yaml +++b/TS26510\_Maf\_Provisioning\_PolicyTemplates.yaml  @@ -1,7 +1,7 @@  1 1 openapi: 3.0.0  2 2 info:  3 3 title: Maf\_Provisioning\_PolicyTemplates  4 - version: 1.0.2  4 + version: 1.0.3  5 5 description: |  6 6 Media Delivery: Policy Templates Provisioning API  7 7 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).  @@ -12,7 +12,7 @@ tags:  12 12 description: 'Media Delivery: Policy Templates Provisioning API'  13 13  14 14 externalDocs:  15 - description: 'TS 26.510 V18.4.0; Media Delivery; Interactions and APIs for media session handling'  15 + description: 'TS 26.510 V19.0.0; Media Delivery; Interactions and APIs for media session handling'  16 16 url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.510/'  17 17  18 18 servers:  @@ -303,7 +303,6 @@ components:  303 303 applicationSessionContexts:  304 304 type: array  305 305 minItems: 1  306 - maxItems: 1  307 306 items:  308 307 type: object  309 308 anyOf: |

# Code changes

The code changes associated with this Change Request are available for review at the following URL on 3GPP Forge:

<https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge_requests/5>

<https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge_requests/5/diffs?commit_id=a3dca77fb7b8f84055d5487b93ce8323be0998ed>

The proposed changes are reproduced below for posterity.

TS26510\_Maf\_Provisioning\_ContentHosting.yaml

---a/TS26510\_Maf\_Provisioning\_ContentHosting.yaml  
+++b/TS26510\_Maf\_Provisioning\_ContentHosting.yaml

@@ -1,7 +1,7 @@

1 1 openapi: 3.0.0

2 2 info:

3 3 title: Maf\_Provisioning\_ContentHosting

4 - version: 1.0.3

4 + version: 1.1.0

5 5 description: |

6 6 Media Delivery: Content Hosting Provisioning API

7 7 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

@@ -12,7 +12,7 @@ tags:

12 12 description: 'Media Delivery: Content Hosting Provisioning API'

13 13

14 14 externalDocs:

15 - description: 'TS 26.510 V18.5.0; Media Delivery; Interactions and APIs for media session handling'

15 + description: 'TS 26.510 V19.0.0; Media Delivery; Interactions and APIs for media session handling'

16 16 url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.510/'

17 17

18 18 servers:

@@ -333,7 +333,22 @@ components:

333 333 BaseDistributionConfiguration:

334 334 type: object

335 335 description: 'Base data type for content distribution configurations.'

336 + required:

337 + - distributionId

338 + - baseURL

336 339 properties:

340 + distributionId:

341 + type: string

342 + description: 'A label that can be referenced by other resources in the Provisioning Session.'

343 + mode:

344 + $ref: 'TS26510\_CommonData.yaml#/components/schemas/ContentTransferMode'

345 + affinityGroup:

346 + type: string

347 + description: >

348 + A label used to indicate how physical endpoint(s) of

349 + the M4 service location exposed by this and other

350 + distribution configurations are deployed across

351 + resilience zones.

337 352 supplementaryDistributionNetworks:

338 353 type: array

339 354 items:

@@ -355,6 +370,8 @@ components:

355 370 $ref: 'TS26510\_CommonData.yaml#/components/schemas/ResourceId'

356 371 domainNameAlias:

357 372 type: string

373 + baseURL:

374 + $ref: 'TS26510\_CommonData.yaml#/components/schemas/AbsoluteUrl'

358 375 entryPoint:

359 376 $ref: 'TS26510\_CommonData.yaml#/components/schemas/RelativeMediaEntryPoint'

360 377 pathRewriteRules:

@@ -412,18 +429,11 @@ components:

412 429 allOf:

413 430 - $ref: '#/components/schemas/BaseDistributionConfiguration'

414 431 - type: object

415 - required:

416 - - canonicalDomainName

417 - - baseURL

418 432 properties:

419 433 canonicalDomainName:

420 434 readOnly: true

421 435 type: string

422 - description: 'Default Fully-Qualified Domain Name assigned by the Media AF for use at reference point M4.'

423 - baseURL:

424 - readOnly: true

425 - allOf:

426 - - $ref: 'TS26510\_CommonData.yaml#/components/schemas/AbsoluteUrl'

436 + description: 'Default Fully-Qualified Domain Name assigned by the Media AF for use at reference point M4 and M10.'

427 437

428 438 # Schema for the resource itself

429 439 ContentHostingConfiguration:

TS26510\_Maf\_Provisioning\_ContentPublishing.yaml

---a/TS26510\_Maf\_Provisioning\_ContentPublishing.yaml  
+++b/TS26510\_Maf\_Provisioning\_ContentPublishing.yaml

@@ -1,7 +1,7 @@

1 1 openapi: 3.0.0

2 2 info:

3 3 title: Maf\_Provisioning\_ContentPublishing

4 - version: 1.0.3

4 + version: 1.1.0

5 5 description: |

6 6 Media Delivery: Content Publishing Provisioning API

7 7 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

@@ -12,7 +12,7 @@ tags:

12 12 description: 'Media Delivery: Content Publishing Provisioning API'

13 13

14 14 externalDocs:

15 - description: 'TS 26.510 V18.4.0; Media Delivery; Interactions and APIs for media session handling'

15 + description: 'TS 26.510 V19.0.0; Media Delivery; Interactions and APIs for media session handling'

16 16 url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.510/'

17 17

18 18 servers:

@@ -265,7 +265,7 @@ paths:

265 265 content:

266 266 application/json:

267 267 schema:

268 - description: 'The aggregate number of cache entries purged in all 5GMSd AS instances distributing content for the requested Provisioning Session.'

268 + description: 'The aggregate number of cache entries purged in all 5GMSu AS instances distributing content for the requested Provisioning Session.'

269 269 type: integer

270 270 minimum: 1

271 271 '204': # No Content

@@ -332,8 +332,23 @@ components:

332 332 type: object

333 333 description: 'A configuration for content contribution.'

334 334 required:

335 + - contributionId

336 + - canonicalDomainName

337 + - baseURL

335 338 - entryPoint

336 339 properties:

340 + contributionId:

341 + type: string

342 + description: 'A label that can be referenced by other resources in the Provisioning Session.'

343 + mode:

344 + $ref: 'TS26510\_CommonData.yaml#/components/schemas/ContentTransferMode'

345 + affinityGroup:

346 + type: string

347 + description: >

348 + A label used to indicate how physical endpoint(s) of

349 + the M4 service location exposed by this and other

350 + contribution configurations are deployed across

351 + resilience zones.

337 352 edgeResourcesConfigurationId:

338 353 $ref: 'TS26510\_CommonData.yaml#/components/schemas/ResourceId'

339 354 contentPreparationTemplateId:

@@ -342,9 +357,14 @@ components:

342 357 allOf:

343 358 - $ref: 'TS26510\_CommonData.yaml#/components/schemas/ResourceId'

344 359 - description: 'A reference to a Server Certificate resource to be presented by the Media AS at reference point M4.'

360 + canonicalDomainName:

361 + type: string

362 + description: 'Default Fully-Qualified Domain Name for use at reference point M4 or M10.'

345 363 domainNameAlias:

346 364 type: string

347 365 description: 'Additional domain name nominated by the Media Application Provider and used by the Media AS to set appropriate CORS HTTP response headers at reference point M4.'

366 + baseURL:

367 + $ref: 'TS26510\_CommonData.yaml#/components/schemas/AbsoluteUrl'

348 368 entryPoint:

349 369 $ref: 'TS26510\_CommonData.yaml#/components/schemas/RelativeMediaEntryPoint'

350 370

@@ -352,19 +372,6 @@ components:

352 372 description: 'A content contribution configuration.'

353 373 allOf:

354 374 - $ref: '#/components/schemas/BaseContributionConfiguration'

355 - - type: object

356 - required:

357 - - canonicalDomainName

358 - - baseURL

359 - properties:

360 - canonicalDomainName:

361 - readOnly: true

362 - type: string

363 - description: 'Default Fully-Qualified Domain Name assigned by the Media AF for use at reference point M4.'

364 - baseURL:

365 - readOnly: true

366 - allOf:

367 - - $ref: 'TS26510\_CommonData.yaml#/components/schemas/AbsoluteUrl'

368 375

369 376 # Schema for the resource itself

370 377 ContentPublishingConfiguration:

# Code changes: Improved QoS Support for Media Streaming services

The code changes associated with this Change Request are available for review at the following URL on 3GPP Forge:

<https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge_requests/6>

<https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge_requests/6/diffs?commit_id=73bdf9b7e5037bf39f783167704c01ccecfe5760>

The proposed changes are reproduced below for posterity.

## TS26510\_CommonData.yaml

---a/TS26510\_CommonData.yaml  
+++b/TS26510\_CommonData.yaml

@@ -1,7 +1,7 @@

1 1 openapi: 3.0.0

2 2 info:

3 3 title: 'Media Delivery: Common Data Types'

4 - version: 1.0.2

4 + version: 1.0.3

5 5 description: |

6 6 Media Delivery: Common Data Types

7 7 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

@@ -12,7 +12,7 @@ tags:

12 12 description: 'Media Delivery: Common Data Types'

13 13

14 14 externalDocs:

15 - description: 'TS 26.510 V18.4.0; Media Delivery; Interactions and APIs for media session handling'

15 + description: 'TS 26.510 V19.0.0; Media Delivery; Interactions and APIs for media session handling'

16 16 url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.510/'

17 17

18 18 paths: {}

@@ -184,6 +184,10 @@ components:

184 184 $ref: 'TS29571\_CommonData.yaml#/components/schemas/PduSetQosPara'

185 185 desiredUplinkPduSetQosParameters:

186 186 $ref: 'TS29571\_CommonData.yaml#/components/schemas/PduSetQosPara'

187 + l4SRequired:

188 + type: boolean

189 + qoSMonitoringRequired:

190 + type: boolean

187 191

188 192 ChargingSpecification:

189 193 type: object

## TS26510\_Maf\_Provisioning\_PolicyTemplates.yaml

---a/TS26510\_Maf\_Provisioning\_PolicyTemplates.yaml  
+++b/TS26510\_Maf\_Provisioning\_PolicyTemplates.yaml

@@ -1,7 +1,7 @@

1 1 openapi: 3.0.0

2 2 info:

3 3 title: Maf\_Provisioning\_PolicyTemplates

4 - version: 1.0.2

4 + version: 1.0.3

5 5 description: |

6 6 Media Delivery: Policy Templates Provisioning API

7 7 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

@@ -12,7 +12,7 @@ tags:

12 12 description: 'Media Delivery: Policy Templates Provisioning API'

13 13

14 14 externalDocs:

15 - description: 'TS 26.510 V18.4.0; Media Delivery; Interactions and APIs for media session handling'

15 + description: 'TS 26.510 V19.0.0; Media Delivery; Interactions and APIs for media session handling'

16 16 url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.510/'

17 17

18 18 servers:

@@ -325,6 +325,11 @@ components:

325 325 $ref: 'TS29122\_CommonData.yaml#/components/schemas/BdtReferenceId'

326 326 bdtSpecification:

327 327 $ref: '#/components/schemas/BdtPolicySchedule'

328 + l4SEnablementPreference:

329 + type: boolean

330 + default: false

331 + qoSMonitoringConfiguration:

332 + $ref: 'TS29122\_AsSessionWithQoS.yaml#/components/schemas/QosMonitoringInformation'

328 333

329 334 BdtPolicySchedule:

330 335 type: object

## TS26510\_Maf\_SessionHandling\_DynamicPolicy.yaml

---a/TS26510\_Maf\_SessionHandling\_DynamicPolicy.yaml  
+++b/TS26510\_Maf\_SessionHandling\_DynamicPolicy.yaml

@@ -1,7 +1,7 @@

1 1 openapi: 3.0.0

2 2 info:

3 3 title: Maf\_SessionHandling\_DynamicPolicy

4 - version: 1.0.2

4 + version: 1.0.3

5 5 description: |

6 6 Media Delivery: Dynamic Policy API

7 7 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

@@ -12,7 +12,7 @@ tags:

12 12 description: 'Media Delivery: Dynamic Policy API'

13 13

14 14 externalDocs:

15 - description: 'TS 26.510 V18.4.0; Media Delivery; Interactions and APIs for media session handling'

15 + description: 'TS 26.510 V19.0.0; Media Delivery; Interactions and APIs for media session handling'

16 16 url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.510/'

17 17

18 18 servers:

@@ -312,6 +312,15 @@ components:

312 312 qosEnforcement:

313 313 readOnly: true

314 314 type: boolean

315 + l4SEnabled:

316 + readOnly: true

317 + type: boolean

318 + qoSMonitoringEnabled:

319 + readOnly: true

320 + type: boolean

321 + qoSMonitoringResults:

322 + readOnly: true

323 + $ref: 'TS29122\_AsSessionWithQoS.yaml#/components/schemas/QosMonitoringReport'

315 324

316 325 ApplicationFlowBinding:

317 326 description: "A binding between an Application Flow and its QoS requirements provided by the Media Client."

## TS26510\_Maf\_SessionHandling\_ServiceAccessInformation.yaml

---a/TS26510\_Maf\_SessionHandling\_ServiceAccessInformation.yaml  
+++b/TS26510\_Maf\_SessionHandling\_ServiceAccessInformation.yaml

@@ -1,7 +1,7 @@

1 1 openapi: 3.0.0

2 2 info:

3 3 title: Maf\_SessionHandling\_ServiceAccessInformation

4 - version: 1.0.2

4 + version: 1.0.3

5 5 description: |

6 6 Media Delivery: Service Access Information API

7 7 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

@@ -12,7 +12,7 @@ tags:

12 12 description: 'Media Delivery: Service Access Information API'

13 13

14 14 externalDocs:

15 - description: 'TS 26.510 V18.4.0; Media Delivery; Interactions and APIs for media session handling'

15 + description: 'TS 26.510 V19.0.0; Media Delivery; Interactions and APIs for media session handling'

16 16 url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.510/'

17 17

18 18 servers:

@@ -204,6 +204,12 @@ components:

204 204 minItems: 1

205 205 items:

206 206 $ref: 'TS26510\_CommonData.yaml#/components/schemas/BdtWindow'

207 + l4SEnablementPreference:

208 + type: boolean

209 + default: false

210 + qoSMonitoringEnablementPreference:

211 + type: boolean

212 + default: false

207 213 sdfMethods:

208 214 type: array

209 215 items:

# Code changes: JSON-based metrics reporting syntax

The code changes associated with this Change Request are available for review at the following URLs on 3GPP Forge:

<https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge_requests/1/diffs?commit_id=50c85a84e0741c99e377028fb99001a2e854a231>

The proposed changes are reproduced below for posterity.

## TS26510\_Maf\_SessionHandling\_MetricsReporting.yaml

---a/TS26510\_Maf\_SessionHandling\_MetricsReporting.yaml  
+++b/TS26510\_Maf\_SessionHandling\_MetricsReporting.yaml

@@ -1,7 +1,7 @@

1 1 openapi: 3.0.0

2 2 info:

3 3 title: Maf\_SessionHandling\_MetricsReporting

4 - version: 1.0.1

4 + version: 1.0.2

5 5 description: |

6 6 Media Delivery: Metrics Reporting API

7 7 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

@@ -12,7 +12,7 @@ tags:

12 12 description: 'Media Delivery: Metrics Reporting API'

13 13

14 14 externalDocs:

15 - description: 'TS 26.510 V18.4.0; Media Delivery; Interactions and APIs for media session handling'

15 + description: 'TS 26.510 V19.0.0; Media Delivery; Interactions and APIs for media session handling'

16 16 url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.510/'

17 17

18 18 servers:

@@ -55,6 +55,10 @@ paths:

55 55 schema:

56 56 type: string

57 57 format: xml

58 + application/3gpp-media-delivery-metrics-report+json:

59 + schema:

60 + $ref: '#/components/schemas/MetricsReport'

61 + format: json

58 62 application/\*:

59 63 schema:

60 64 type: string

@@ -98,3 +102,61 @@ components:

98 102 tokenUrl: '{tokenUrl}'

99 103 scopes:

100 104 metrics-report\_submit: Submit a metrics report

105 +

106 + schemas:

107 + MetricsReport:

108 + description: 'A timestamped report of QoE metrics pertaining to one or more media delivery sessions'

109 + type: object

110 + required:

111 + - reportTimestamp

112 + - sessions

113 + properties:

114 + reportTimestamp:

115 + $ref: 'TS29571\_CommonData.yaml#/components/schemas/DateTime'

116 + sessions:

117 + type: array

118 + items:

119 + $ref: '#/components/schemas/MetricsSession'

120 + minItems: 0

121 +

122 + MetricsSession:

123 + description: 'A set of metrics samples pertaining to a particular media delivery session'

124 + type: object

125 + required:

126 + - clientId

127 + - provisioingSessionId

128 + - sessionId

129 + properties:

130 + clientId:

131 + type: string

132 + provisioningSessionId:

133 + $ref: 'TS26510\_CommonData.yaml#/components/schemas/ResourceId'

134 + sessionId:

135 + $ref: 'TS26510\_CommonData.yaml#/components/schemas/MediaDeliverySessionId'

136 + contentId:

137 + type: string

138 + description: 'Identifying the content currently being consumed in the media delivery session.'

139 + samples:

140 + type: array

141 + items:

142 + $ref: '#/components/schemas/MetricsSample'

143 + minItems: 0

144 +

145 + MetricsSample:

146 + description: 'An abstract timestamped sample of one or more metrics'

147 + type: object

148 + required:

149 + - sampleTimestamp

150 + anyOf:

151 + - required: [mediaStreamingClientData]

152 + properties:

153 + sampleTimestamp:

154 + $ref: 'TS29571\_CommonData.yaml#/components/schemas/DateTime'

155 + sliceInfo:

156 + $ref: 'TS29571\_CommonData.yaml#/components/schemas/Snssai'

157 + dataNetworkName:

158 + $ref: 'TS29571\_CommonData.yaml#/components/schemas/Dnn'

159 + mediaStreamingClientData:

160 + allOf:

161 + - $ref: 'TS26512\_ClientData.yaml#/components/schemas/MediaStreamingClientData'

162 + - description: 'Client data for the 5G Media Streaming System. See clause 11.4.3.3 of TS 26.512.'

# Code changes for dynamically changing traffic characteristics

The code changes associated with this Change Request are available for review at the following URL on 3GPP Forge:

<https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge_requests/7>

<https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge_requests/7/diffs?commit_id=8117dcbde7aea96303908080445ff71c5906ce7b>

The proposed changes are reproduced below for posterity.

## TS26510\_CommonData.yaml

---a/TS26510\_CommonData.yaml  
+++b/TS26510\_CommonData.yaml

@@ -1,7 +1,7 @@

1 1 openapi: 3.0.0

2 2 info:

3 3 title: 'Media Delivery: Common Data Types'

4 - version: 1.0.2

4 + version: 1.0.3

5 5 description: |

6 6 Media Delivery: Common Data Types

7 7 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

@@ -12,7 +12,7 @@ tags:

12 12 description: 'Media Delivery: Common Data Types'

13 13

14 14 externalDocs:

15 - description: 'TS 26.510 V18.4.0; Media Delivery; Interactions and APIs for media session handling'

15 + description: 'TS 26.510 V19.0.0; Media Delivery; Interactions and APIs for media session handling'

16 16 url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.510/'

17 17

18 18 paths: {}

@@ -151,6 +151,15 @@ components:

151 151 pduSetMarking:

152 152 type: boolean

153 153 default: false

154 + downlinkDataBurstSizeMarkingRequired:

155 + type: boolean

156 + default: false

157 + downlinkTimeToNextBurstMarkingRequired:

158 + type: boolean

159 + default: false

160 + downlinkExpeditedTransferIndicationMarkingRequired:

161 + type: boolean

162 + default: false

154 163

155 164 UnidirectionalBitRateSpecification:

156 165 type: object

@@ -184,6 +193,9 @@ components:

184 193 $ref: 'TS29571\_CommonData.yaml#/components/schemas/PduSetQosPara'

185 194 desiredUplinkPduSetQosParameters:

186 195 $ref: 'TS29571\_CommonData.yaml#/components/schemas/PduSetQosPara'

196 + downlinkExpeditedTransferIndication:

197 + type: boolean

198 + default: false

187 199

188 200 ChargingSpecification:

189 201 type: object

## TS26510\_Maf\_SessionHandling\_ServiceAccessInformation.yaml

---a/TS26510\_Maf\_SessionHandling\_ServiceAccessInformation.yaml  
+++b/TS26510\_Maf\_SessionHandling\_ServiceAccessInformation.yaml

@@ -1,7 +1,7 @@

1 1 openapi: 3.0.0

2 2 info:

3 3 title: Maf\_SessionHandling\_ServiceAccessInformation

4 - version: 1.0.2

4 + version: 1.0.3

5 5 description: |

6 6 Media Delivery: Service Access Information API

7 7 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

@@ -12,7 +12,7 @@ tags:

12 12 description: 'Media Delivery: Service Access Information API'

13 13

14 14 externalDocs:

15 - description: 'TS 26.510 V18.4.0; Media Delivery; Interactions and APIs for media session handling'

15 + description: 'TS 26.510 V19.0.0; Media Delivery; Interactions and APIs for media session handling'

16 16 url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.510/'

17 17

18 18 servers:

@@ -199,6 +199,15 @@ components:

199 199 pduSetMarking:

200 200 type: boolean

201 201 default: false

202 + downlinkDataBurstSizeMarkingRequired:

203 + type: boolean

204 + default: false

205 + downlinkTimeToNextBurstMarkingRequired:

206 + type: boolean

207 + default: false

208 + downlinkExpeditedTransferIndicationMarkingRequired:

209 + type: boolean

210 + default: false

202 211 bdtWindows:

203 212 type: array

204 213 minItems: 1

# Code changes for multiplexed media flows

The code changes associated with this Change Request are available for review at the following URL on 3GPP Forge:

https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge\_requests/TBA

https://forge.3gpp.org/rep/sa4/amd-pro-med/-/merge\_requests/TBA

The proposed changes are reproduced below for posterity.

References

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

• References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

• For a specific reference, subsequent revisions do not apply.

• For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System architecture for the 5G System (5GS)".

[3] 3GPP TS 23.502: "Procedures for the 5G System (5GS); Stage 2".

[4] 3GPP TS 26.501: "5G Media Streaming (5GMS); General description and architecture".

[5] 3GPP TS 26.506: "5G Real-time Media Communication Architecture (Stage 2)".

[6] 3GPP TS 26.512: "5G Media Streaming (5GMS); Protocols".

[7] 3GPP TS 26.113: "Real-Time Media Communication; Protocols and APIs".

[8] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[9] 3GPP TS 26.118: "Virtual Reality (VR) profiles for streaming applications".

[10] ITU-T Recommendation X.509 (2005) | ISO/IEC 9594-8:2005: "Information Technology – Open Systems Interconnection – The Directory: Public-key and attribute certificate frameworks".

[11] IETF RFC 5280: "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile", May 2008.

[12] IETF RFC 7468: "Textual Encodings of PKIX, PKCS, and CMS Structures", April 2015.

[13] 3GPP TS 23.558: "Architecture for enabling edge applications".

[14] 3GPP TS 24.558: "Enabling Edge Applications; Protocol specification".

[15] 3GPP TS 29.558: "Enabling Edge Applications; Application Programming Interface (API) specification; Stage 3".

[16] 3GPP TS 23.003: "Numbering, addressing and identification".

[17] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[18] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[19] 3GPP TS 29.522: "5G System. Network Exposure Function Northbound APIs; Stage 3".

[20] 3GPP TS 29.122: "T8 reference point for Northbound APIs".

[21] 3GPP TS 27.007: "AT Command set for User Equipment (UE)".

[22] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

[23] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".

[24] IETF RFC 9110: "HTTP Semantics", June 2022.

[25] IETF RFC 9111: "HTTP Caching", June 2022.

[26] IETF RFC 9112: "HTTP/1.1", June 2022.

[27] IETF RFC 9113: "HTTP/2", June 2022.

[28] 3GPP TS 26.531: "Data Collection and Reporting; General Description and Architecture".

[29] IETF RFC 8446: "The Transport Layer Security (TLS) Protocol Version 1.3", August 2018.

[30] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[31] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[32] OpenAPI: "OpenAPI 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.

[33] 3GPP TS 29.571: "Common Data Types for Service Based Interfaces; Stage 3".

[34] IETF RFC 3339: "Date and Time on the Internet: Timestamps", July 2002.

[35] IETF RFC 3986: "URI Generic Syntax", June 2005.

[36] Standard ECMA-262, 5.1 Edition: "ECMAScript Language Specification", June 2011.

[37] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format", December 2017.

[38] IETF draft-bhutton-json-schema-validation: "JSON Schema Validation: A Vocabulary for Structural Validation of JSON", June 2022.

[39] 3GPP TS 29.517: "5G System; Application Function Event Exposure Service; Stage 3".

[40] 3GPP TS 26.532: "Data Collection and Reporting; Protocols and Formats".

[41] ISO 3166‑1: "Codes for the representation of names of countries and their subdivisions — Part 1: Country codes".

[42] ISO 3166‑2: "Codes for the representation of names of countries and their subdivisions — Part 2: Country subdivision code".

[43] IETF RFC 2474: "Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers", December 1998.

[44] IETF RFC 3246: "An Expedited Forwarding PHB (Per-Hop Behavior)", March 2022.

[45] IETF RFC 2597: "Assured Forwarding PHB Group", June 1999.

[46] 3GPP TS 29.554: "5G System; Background Data Transfer Policy Control Service; Stage 3".

[47] IETF RFC 6749: "The OAuth 2.0 Authorization Framework", October 2012.

[48] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3".

[49] IETF RFC 7230: "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing", June 2014.

[50] OASIS: "MQTT Version 5.0", <https://docs.oasis-open.org/mqtt/mqtt/v5.0/mqtt-v5.0.html>.

[51] IETC RFC 7519: "JSON Web Token (JWT)", May 2015.

[52] 3GPP TS 29.564: "5G System; User Plane Function Services; Stage 3".

[53] IETF RFC 9330:"Low Latency, Low Loss, Scalable Throughput (L4S) Internet Service: Architecture", January 2023.

[54] IETF RFC 9331: "Explicit Congestion Notification (ECN) Protocol for Very Low Queuing Delay (L4S)", January 2023.

[55] IETF RFC 9332: "Dual-Queue Coupled Active Queue Management (AQM) for Low Latency, Low Loss, and Scalable Throughput (L4S)", January 2023.

Definitions of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in TR 21.905 [1], TS 26.501 [4], TS 26.506 [5] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1], TS 26.501 [4] or TS 26.506 [5].

**affinity group:** A set of service locations that may be physically co-located.

**Media Delivery System:** A deployment of a 5GMS System or RTC System.

**media delivery:** Delivery of media using a Media Delivery System.

**media delivery session**: the time interval during which media is delivered between a Media AS and one or more Media Client participants via reference point M4 at the initiation of an application (which may be a Media-aware Application) associated with each participating Media Client.

**media delivery session identifier**: a string that uniquely identifies a media delivery session in a Media Delivery System for the purpose of collating information from different system functions.

**Media EAS:** Media Application Server deployed as an Edge Application Server.

**physical endpoint:** A deployed instance of an Application Server service that is exposed to UEs by means of a (possibly non-unique) combination of a network layer address (e.g., IP address) and a transport layer address (e.g., TCP or UDP port number).

**service location:** An application layer endpoint address (e.g., URL protocol, authority and path) of a service that may be realised by multiple physical endpoints that may share the same network layer address and transport layer address.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

5GC 5G Core

AF Application Function

ANBR Access Network Bit rate Recommendation

API Application Programming Interface

AS Application Server

BDT Background Data Transfer

CHEM Coverage and Handoff Enhancements using Multimedia error robustness

DN Data Network

DS Differentiated Services

DSCP DS Code Point

EAS Edge Application Server

ECN Explicit Congestion Notification

EEC Edge Enabler Client

EES Edge Enabler Server

FQDN Fully Qualified Domain Name

GPSI Generic Public Subscription Identifier

ICE Interactive Connectivity Establishment

JSON JavaScript Object Notation

L4S Low Latency, Low Loss and Scalable Throughput

MFBR Maximum Flow Bit Rate

NEF Network Exposure Function

OAM Operations, Administration and Maintenance

PCC Policy Control and Charging

PCF Policy Control Function

PDR Packet Detection Rule

PHB Per-Hop Behaviour

PSI PDU Set Importance

QoE Quality of Experience

QoS Quality of Service

QFI QoS Flow Identifier

RTC Real-Time (media) Communication

STUN Session Traversal Utilities for NAT, Simple Traversal of User Datagram Protocol (UDP) through Network Address Translators

SWAP Simple WebRTC Application Protocol

TCP Transmission Control Protocol

TOS Type of Service

TURN Traversal Using Relays around NAT

UE User Equipment

URI Uniform Resource Identifier

URL Uniform Resource Locator

Provisioning (M1) interactions

### 5.2.1 Overview

A Media Application Provider may use the operations in this clause to provision the different features offered by the Media Delivery System in the Media AF. The Provisioning API exposed by the Media AF to the Media Application Provider at reference point M1 offers the following sets of operations:

1. Provisioning of *Provisioning Sessions* (see clause 5.2.2) to act as an umbrella for the following provisioning information. Each such Provisioning Session is uniquely identified by a system-dependent Provisioning Session identifier as well as by system-independent service identifier that is subsequently used by an application to launch media session handling via a 3GPP Service URL (see clause 6) or used by a Media-aware Application to invoke a method on the Media Session Handler (see clause 5.4.2).

2. Discovery of the set of content ingest and/or egest protocols supported by the Media AS for a particular Provisioning Session (see clause 5.2.3):

- For downlink media streaming according to TS 26.512 [6], discovery of the content ingest protocols available at reference point M2 and M10, and the content distribution protocols available at reference point M4 and M10.

- For uplink media streaming according to TS 26.512 [6], discovery of the content contribution protocols available at reference point M4 and the content egest protocols available at reference point M2 and M10.

3. Provisioning of *Server Certificates* within the scope of a Provisioning Session (see clause 5.2.4) to be used by the Media AS to assert its identity to the Media Access Function in Media Clients during media delivery sessions at reference point M4.

4. Provisioning of *Content Preparation Templates* within the scope of a Provisioning Session (see clause 5.2.5) that can be used by the Media AS to manipulate media content ingested at reference point M2 or M10, or contributed at reference point M4.

5. Provisioning of *Edge Resources* within the scope of a Provisioning Session (see clause 5.2.6) to be used to instantiate the Media AS as a set of Edge Application Servers (EAS) in an Edge Data Network (EDN) using the APIs specified in TS 29.558 [15].

6. Provisioning of *Policy Templates* within the scope of a Provisioning Session (see clause 5.2.7) that can be applied to M4 downlink/uplink media delivery sessions in order to realise different Service Operation Points as part of the Dynamic Policies feature (see clause 5.3.3).

7. Provisioning of media delivery by the Media AS within the scope of a Provisioning Session using the abovementioned building blocks:

- For downlink media streaming according to TS 26.512 [6], provisioning of the *Content Hosting* feature of the Media AS (see clause 5.2.8), which offers functionality equivalent to that of a public Content Delivery Network (CDN): content ingest at reference point M2 or M10 for onward distribution by the Media AS to Media Clients via reference point M4 or via other distribution systems such as eMBMS or MBS.

After discovering the set of ingest and distribution content protocols supported by the Media AS (see clause 5.2.3), the Media Application Provider may provision a Server Certificate (see clause 5.2.4), Content Preparation Template (see clause 5.2.5) and/or Edge Resources Configuration (see clause 5.2.6) for each Content Hosting distribution configuration to reference. The Media Application Provider may also provision one or more Policy Templates (see clause 5.2.7) to realise Service Operation Points pertaining to downlink media delivery.

- For uplink media streaming according to TS 26.512 [6], provisioning of the *Content Publishing* feature of the Media AS (see clause 5.2.9), including content contribution by Media Clients at reference point M4 and subsequent content egest of content at reference point M2 or M10 after optional manipulation by a Content Preparation Template.

After discovering the set of contribution and egest content protocols supported by the Media AS (see clause 5.2.2), the Media Application Provider may provision a Server Certificate (see clause 5.2.4), Content Preparation Template (see clause 5.2.5) and/or Edge Resources Configuration (see clause 5.2.6) for each Content Publishing contribution configuration to reference. The Media Application Provider may also provision one or more Policy Templates (see clause 5.2.7) to realise Service Operation Points relevant to the parent Provisioning Session.

- For real-time media communication according to TS 26.113 [7], provisioning of the RTC functionality of the Media AS (see clause 5.2.10).

The Media Application Provider may provision the WebRTC Signalling Function and ICE Function (including TURN and STUN services) of the Media AS to facilitate communication between two RTC endpoints. Additionally, the Media Application Provider may provision Server Certificates (see clause 5.2.4) for presentation by these subfunctions to Media Clients. Alternatively, the Media Application Provider may provide these subfunctions itself and inform the Media AF of their endpoint addresses at the time of provisioning.

The Media Application Provider may additionally provision an Edge Resources Configuration (see clause 5.2.6) for the RTC Configuration to reference. The Media Application Provider may also provision one or more Policy Templates (see clause 5.2.7) for the RTC Configuration to reference that the Media Session Handler is then able to instantiate for RTC-based media delivery sessions.

8. Provisioning of *QoE metrics reporting* within the scope of a Provisioning Session (see clause 5.2.11) to configure how and how often the Media Client should report Quality of Experience metrics to the Media AF during the course of media delivery sessions at reference point M4.

9. Provisioning of *consumption reporting* within the scope of a Provisioning Session (see clause 5.2.12) to configure how often the Media Client should report downlink media consumption to the Media AF during the course of media delivery sessions at reference point M4.

10. Provisioning of rules for processing of UE data (see clause 5.2.13) related to media delivery sessions by the Data Collection AF instantiated in the Media AF (as defined in clause 4.7 of TS 26.501 [4]), and for restricting its exposure over reference points R5 and R6 by means of Event Data Processing Configurations and Data Access Profiles for a particular Event ID.

NOTE: The *Network Assistance* feature is not provisioned by the Media Application Provider at reference point M1. Instead, it is provisioned at the discretion of the Media Delivery System operator using means beyond the scope of the present document.

Content protocols discovery

#### 5.2.3.1 General

The set of downlink content ingest and/or uplink content egest protocols supported by the Media AS at reference point M2 and M10, and the set of downlink content distribution and/or uplink content contribution protocols supported by the Media AS at reference point M4 and M10 are described by the Content Protocols resource exposed by the Media AF at reference point M1, as specified in clause 8.3.3.1. This resource shall exist in the Media AF as a sub-resource of each created Provisioning Session and may therefore be different for each one, for example to offer different content protocols depending on properties of the parent Provisioning Session or Media Application Provider.

NOTE: The information contained in the Content Protocols resource is useful to the Media Application Provider when it provides Service Access Information to the Media-aware Application at reference point M8.

HTTP responses for successful and operation-specific failure cases are specified in the following clauses. For all other failure cases, an HTTP response indicating a response code in accordance with clause 7.1.6 shall be returned to the API client. In all failure cases a message body in accordance with clause 7.1.7 shall be included in the response message.

#### 5.2.3.2 Create Content Protocols resource operation

The Create operation is not permitted for the Content Protocols resource. Any usage of the HTTP POST method in relation to its well-known resource URL shall result in the HTTP response 405 (Method Not Allowed) that includes an error message body per clause 7.1.7.

#### 5.2.3.3 Retrieve Content Protocols resource operation

This operation is used by the Media Application Provider to retrieve from the Media AF a list of downlink content ingest protocols and/or uplink content egest protocols supported by the Media AS at reference point M2 and M10 and a list of downlink content distribution and/or uplink content contribution protocols supported by the Media AS at reference point M4 and M10. The HTTP GET method shall be used for this purpose, citing the well-known URL of the Content Protocols resource.

If the operation is successful, the Media AF shall return a 200 (OK) response that includes a Content Protocols resource in the response message body, as specified in clause 8.3.3.1.

Content Preparation provisioning

#### 5.2.5.1 General

For downlink media delivery, the Media AS may be required to process content ingested at reference point M2 or M10 before distributing it at reference point M4 or M10. For uplink media delivery, the Media AS may be required to process content contributed by Media Clients before publishing it to the Media Application Provider at reference point M2 or M10. These content processing operations are described by a Content Preparation Template resource provisioned in the Media AF by the Media Application Provider at reference point M1, as specified in clause 8.5, and subsequently configured in the Media AS by the Media AF at reference point M3 using an API outside the scope of the present document.

HTTP responses for successful and operation-specific failure cases are specified in the following clauses. For all other failure cases, an HTTP response indicating a response code in accordance with clause 7.1.6 shall be returned to the API client. In all failure cases a message body in accordance with clause 7.1.7 shall be included in the response message.

Dynamic Policy Provisioning (M1)

#### 5.2.7.1 General

These operations are used by the Media Application Provider to configure Policy Templates for the media delivery sessions of a particular Provisioning Session.

A Policy Template, identified by its policyTemplateId, represents a set of PCF/NEF API parameters which defines the service quality and/or associated charging for the corresponding media delivery session(s). The Policy Template is configured as part of the provisioning procedures with the Media AF using the API specified in clause 8.7 and is subsequently instantiated by a Media Session Handler or Media AS (whichever is acting as Dynamic Policy invoker) using the interactions specified in clause 5.3.3.

When a Policy Template requires media to be delivered in specific Data Network(s) and/or network slice(s) at reference point M4, the applicationSessionContext array shall be present with at least one of the following properties populated in each member of the array:

- The dnn property contains the name of the Data Network in which the Media AS is hosted.

- When Network Slicing is used, the sliceInfo property contains information about the network slice which is serving the UE.

Multiple Network Slice and/or Data Network tuples may be provisioned if the Policy Template allows media to be delivered in multiple Data Networks and/or network slices at reference point M4.

When a Policy Template is intended to influence the network QoS of Service Data Flows used for media delivery, the qoSSpecifications array shall be populated with objects of type Policy‌Constraints (see clause 7.3.3.4). Each member of the array describes the QoS limits of an application service component that a Media Client is permitted request when instantiating the Policy Template:

- The componentReference property is a string used by the Dynamic Policy invoker to reference this Policy‌Constraints when instantiating the Policy Template. It shall be unique for all members of the same qoSSpecifications array.

- The qosReference value, as specified in clause 5.6.2.7 of TS 29.514 [18], is obtained with the Service Level Agreement. See TS 23.502 [3] for detailed usage.

- The maximumBitRate properties of the downlinkQosSpecification and uplinkQosSpecification objects define the maximal bit rates which are permitted to be requested by a Dynamic Policy invoker on (respectively) downlink and uplink Service Data Flows. These values are defined by configuration of the 5G System and are therefore populated by the Media AF rather than by the Media Application Provider.

- The maximumAuthorisedBitRate properties of the downlinkQosSpecification and uplinkQosSpecification objects define the maximal bit rates which a Dynamic Policy invoker is authorised to request on (respectively) downlink and uplink Service Data Flows. Higher bit rates are not authorised by the Media Application Provider when the Policy Template is instantiated.

- The minimumPacketLossRate properties of the downlinkQosSpecification and uplinkQosSpecification objects define the minimal packet loss rates which are permitted to be requested by a Dynamic Policy invoker on (respectively) downlink and uplink Service Data Flows. Lower packet loss rates are not permitted by the Media Application Provider when the Policy Template is instantiated.

- The pduSetQosLimits properties of the downlinkQosSpecification and uplinkQosSpecification objects define the minimal delay budget and minimal error rates for PDU Sets which are permitted to be requested by a Dynamic Policy invoker on (respectively) downlink and uplink Service Data Flows. Lower delay and error rates are not permitted by the Media Application Provider when the Policy Template is instantiated.

- The pduSetMarking flag is used to specify whether Media Clients instantiating this Policy Template for uplink media delivery, or Media AS instances for downlink media delivery, are required to apply PDU Set marking to media transport protocol PDUs falling within the scope of a Dynamic Policy Instance based on this Policy Template.

NOTE 1: PDU Set marking is used by the 5G System to satisfy the QoS requirements of application flows.

- The downlinkDataBurstSizeMarkingRequired flag is used to specify whether the Media AS is required to apply data burst size marking to downlink PDUs falling within the scope of a Dynamic Policy Instance based on this Policy Template.

- The downlinkTimeToNextBurstMarkingRequired flag is used to specify whether the Media AS is required to apply time to next burst marking to downlink PDUs falling within the scope of a Dynamic Policy Instance based on this Policy Template.

- The downlinkExpeditedTransferIndicationMarkingRequiredflag is used to specify whether the Dynamic Policy invoker (Media Client or the Media AS) is allowed to configure different QoS requirements for expedited and non-expedited PDU delivery, and whether the Media AS is required to apply expedited transfer indication marking to downlink PDUs falling within the scope of a Dynamic Policy Instance based on this Policy Template.

When a Policy Template is intended to be used for differential charging, the chargingSpecification property shall be present.

When a Policy Template is intended to be used for Background Data Transfer, the properties of a new Background Data Transfer policy are specified by the Media Application Provider in the bdtSpecification property (of type Bdt‌Policy‌Schedule).

- The startDate and endDate indicate the time period for which the Background Data Transfer specification is valid. A Background Data Transfer specification may be removed from its parent Policy Template by the Media AF when it expires.

- The windows property indicates the time windows over which the Background Data Transfer may occur.

- Each such time window is characterised by a start time (startTime), a duration (duration) and the days of the week on which the time window is scheduled (daysOfWeek).

- The numberOfUes property indicates the maximum number of UEs permitted to instantiate the Policy Template and make use of Background Data Transfers during a single time window instance.

- The estimatedDataVolumePerUe that reflects the average data volume that each UE is expected to transfer during a single time window instance.

NOTE 2: The product of the numberOfUes and estimatedDataVolumePerUe properties represents an estimate of the maximum data volume that may be transferred during any given time window instance.

- The aggregate‌Uplink‌BitRate‌Limit and aggregate‌DownlinkBitRate‌Limit properties specify limits on the total aggregate bit rate of all currently instantiated Policy Templates to be enforced by the Media AF's admission control function. If omitted, the Media AF may instantiate a Policy Template with a Background Data Transfer specification regardless of additional costs that may be incurred by the Media Application Provider as a result.

When a Policy Template prefers ECN marking for L4S functionality to be enabled according to RFC 9330 [53], RFC 9331 [54] and RFC 9332 [55], the l4S‌Enablement‌Preference property shall be present and set to true. The Media AF shall reject the Policy Template if the Media AS does not support ECN marking for L4S functionality.

When a Policy Template prefers QoS monitoring functionality to be enabled, the qoSMonitoringConfiguration property shall be populated with a QosMonitoringInformation object as specified in clause 5.14.2.1.6 of TS 29.122 [20].

HTTP responses for successful and operation-specific failure cases are specified in the following clauses. For all other failure cases, an HTTP response indicating a response code in accordance with clause 7.1.6 shall be returned to the API client. In all failure cases a message body in accordance with clause 7.1.7 shall be included in the response message.

Content Hosting Configuration Provisioning (M1)

#### 5.2.8.2 Create Content Hosting Configuration resource operation

This operation is used by the Media Application Provider at reference point M1 to activate the Content Hosting feature for a particular Provisioning Session. The Media Application Provider shall use the HTTP POST method for this purpose. The request URL shall be a well-known sub-resource of the Provisioning Session resource, as specified in clause 8.8.2. The HTTP request message body shall be a Content Hosting Configuration resource representation, as specified in clause 8.8.3.1. There is at most one Content Hosting Configuration at a time for a given Provisioning Session.

Regarding the configuration of content ingest by the Media AS from the Media Application Provider at reference point M2 or from another Media AS at reference point M10:

- If the Content Hosting Configuration uses the pull-based content ingest method, i.e., the IngestConfiguration.‌mode attribute is set to PULL, then the IngestConfiguration.‌baseURL property shall be nominated by the Media Application Provider in the request message body. The Media AF shall return the IngestConfiguration.‌baseURL property value unchanged in its response message body.

- If the Content Hosting Configuration uses the push-based content ingest method, i.e., the IngestConfiguration.mode attribute is set to PUSH, then the IngestConfiguration.baseURL property shall be nominated by the Media AF and returned in the response message body. It shall not be set by the Media Application Provider in the request message body.

Regarding the configuration(s) of content distribution by the Media AS to the Media Client from reference point M4 service locations or to another Media AS from reference point M10 service locations:

- The Media Application Provider defines one or more distribution configurations in the distributionConfigurations array within a Content Hosting Configuration to distribute content via the Media AS. When more than one content distribution configuration is provided in the HTTP request message body, the operation to create the Content Hosting Configuration resource shall be successful if and only if all such distribution configurations are acceptable to the Media AF.

- As a side-effect of provisioning, the Media AF associates a Media AS service location exposed at reference point M4 or M10 with every distribution. A service location may be associated with one or more physical endpoints at the discretion of the Media AF, subject to guidance from the Media Application Provider as described below.

NOTE: When HTTP [24] is used as the media delivery protocol at reference point M4 or M10, a service location is distinguished by a unique combination of protocol, authority (host name and port) and base path. The same service location may be associated with different physical endpoints using techniques such as anycast IP routing or DNS round-robin resolution.

- Every distribution configuration shall be assigned an identification label by the Media Application Provider, unique within the scope of the parent Content Hosting Configuration, in the DistributionConfiguration.‌distributionId property. This identification label may be referenced from other resources in the Provisioning Session, such as a Content Preparation Template (see clause 5.2.5).

- A distribution configuration may be configured to distribute content at either reference point M4 or M10. In all cases where the distribution configuration is configured to distribute content at reference point M4, the DistributionConfiguration.mode shall be set to PULL.

- The Media Application Provider may use the DistributionConfiguration.‌affinityGroup property to indicate to the Media AF that the physical endpoint(s) realising the Media AS service location associated with a distribution configuration may or may not be co-located with those of another service location associated with another distribution configuration defined in the same Content Hosting Configuration. The physical endpoint(s) of Media AS service locations associated with distribution configurations declaring different Distribution‌Configuration.‌affinityGroup values shall not be co-located.

- In all cases, the DistributionConfiguration.‌canonicalDomainName property is read-only at reference point M1: it shall always be omitted from the creation request and shall be assigned by the Media AF, allowing its value to be inspected by the Media Application Provider in the returned Content Hosting Configuration resource representation, or by using the operation specified in clause 5.2.8.3 below.

- The DistributionConfiguration.baseURL property is:

- Read-only at reference point M1 in all cases where DistributionConfiguration.‌mode is set to PULL. The DistributionConfiguration.‌baseURL shall always be omitted from the creation request and shall be assigned by the Media AF, allowing its value to be inspected by the Media Application Provider in the returned Content Hosting Configuration resource representation, or by using the operation specified in clause 5.2.8.3 below.

- Assigned by the Media Application Provider in all cases where DistributionConfiguration.‌mode is set to PUSH. The Media AF shall return the Media AS DistributionConfiguration.‌baseURL property value unchanged in its response message body.

- If the DistributionConfiguration.‌certificateId property is present and valid, the Media AF shall assign a canonical domain name for the Media AS to expose at reference point M4 service locations that matches the Common Name and the first Subject Alternative Name in the referenced Server Certificate resource (taking into account wildcard matching) regardless of whether the corresponding X.509 certificate was created using the operation specified in clause 5.2.4.2 or those specified in clauses 5.2.4.3 and 5.2.4.4.

- The Media Application Provider may nominate an alternative domain name to be advertised to the Media Client in the Service Access Information by setting the DistributionConfiguration.‌domainNameAlias property when (and only when) creating the Content Hosting Configuration resource. If valid, the value of this property shall then appear in the Distribution‌Configuration.‌baseURL assigned by the Media AF instead of DistributionConfiguration.‌canonicalDomainName. The Media Application Provider shall ensure that this domain name alias resolves to the canonical domain name of the Media AS notified by the Media AF in its response by means of suitable DNS configuration.

- If the DistributionConfiguration.‌entryPoint property is present and valid, the Media Entry Point applies to all content distributed from the Media AS service location associated with the distribution configuration in question. Additionally:

- The RelativeMediaEntryPoint.‌relativePath property shall be defined that points to a Media Entry Point resource.

- The RelativeMediaEntryPoint.‌contentType property shall be defined that provides the MIME content type of the Media Entry Point.

- The RelativeMediaEntryPoint.‌profiles array may optionally specify a list of conformance profile URIs associated with the Media Entry Point where a profile may indicate an interoperability point, for example.

A Media Entry Point resource may additionally include configuration for the purposes of accessing the content from multiple service locations either hosted by the Media AS (i.e., available via reference point M4) or by the Media Application Provider (i.e., available via reference point M13).

When the pull-based content ingest is by a downstream Media AS from an upstream Media AS via reference point M10, the following applies in addition:

- The upstream Media AS Content Hosting Configuration shall be provisioned first. It may use either the pull-based content ingest method, i.e., the IngestConfiguration.‌mode attribute is set to PULL, or the push-based content ingest method, i.e., the IngestConfiguration.‌mode attribute is set to PUSH.

- The DistributionConfiguration.‌mode for the distribution configuration defined in the upstream Media AS Content Hosting Configuration that is intended to serve the downstream Media AS at reference point M10 shall be set to PULL.

- The downstream Media AS Content Hosting Configuration shall be provisioned after the upstream Media AS using the pull-based content ingest method, i.e., the IngestConfiguration.‌mode property shall be set to PULL.

- The IngestConfiguration.‌baseURL property of the downstream Media AS Content Hosting Configuration shall be set by the Media Application Provider in the request message body to be the same value as the DistributionConfiguration.‌baseURL of the distribution of the upstream Media AS Content Hosting Configuration intended to serve the downstream Media AS at reference point M10.

When the push-based content ingest is by a downstream Media AS from an upstream Media AS at reference point M10, the following applies in addition:

- The downstream Media AS Content Hosting Configuration shall be provisioned first using the push-based content ingest method, i.e., the IngestConfiguration.‌mode property shall be set to PUSH.

- The upstream Media AS Content Hosting Configuration shall be provisioned after the downstream Media AS. It shall use the push-based content ingest method, i.e., the IngestConfiguration.‌mode attribute is set to PUSH, and it shall contain at least one distribution intended to serve the downstream Media AS at reference point M10. This distribution configuration shall use the push-based content distribution method, i.e., the DistributionConfiguration.‌mode shall be set to PUSH.

- The DistributionConfiguration.‌baseURL property of the upstream Media AS Content Hosting Configuration for the distribution intended to serve the downstream Media AS shall be set by the Media Application Provider to be the same values as the IngestConfiguration.‌baseURL of the downstream Media AS Content Hosting Configuration that was nominated by the Media AF and returned in the response message body when the Content Hosting Configuration of the downstream Media AS was provisioned.

If the operation is successful, the Media AF shall return a 201 (Created) HTTP response message, and the request URL shall be returned as the value of the Location HTTP header field. The response message body shall be a representation of the current state of the Content Hosting Configuration resource (see clause 8.8.3.1), including any properties assigned by the Media AF.

If any resources referenced by the supplied Content Hosting Configuration resource representation are invalid, the create operation shall fail with an HTTP response status code of 400 (Bad Request) and an error message body per clause 7.1.7. In this case, the Content Hosting Configuration resource shall remain in an uncreated state in the Media AF.

If DistributionConfiguration.‌domainNameAlias is set in the supplied Content Hosting Configuration resource representation but its value is not a syntactically valid Fully-Qualified Domain Name or if the DistributionConfiguration.‌certificateId property is absent or if the supplied domain name alias does match any of one of the Subject Alternative Names listed in the Server Certificate referenced by the DistributionConfiguration.‌certificateId property, the create operation shall fail with an HTTP response status code of 400 (Bad Request) and an error message body per clause 7.1.7. In this case, the Content Hosting Configuration resource shall remain in an uncreated state in the Media AF.

NOTE: Even if multiple distribution configurations in the same Content Hosting Configuration reference the same Server Certificate resource, they may each nominate a different domain name alias from among its Subject Alternative Names.

Attempting to create a Content Hosting Configuration in the scope of a Provisioning Session of any type other than MS\_DOWNLINK shall fail with an HTTP response status code of 403 (Forbidden) and an error message body per clause 7.1.7. In this case, the Content Hosting Configuration resource shall remain in an uncreated state in the Media AF.

If the request is acceptable but the Media AF is unable to provision the resources required by the supplied Content Hosting Configuration, the create operation shall fail with an HTTP response status code of 500 (Internal Server Error) and an error message body per clause 7.1.7. In this case, the Content Hosting Configuration resource shall remain in an uncreated state in the Media AF.

#### 5.2.8.6 Purge Content Hosting cache operation

This operation is used by the Media Application Provider to purge content from the Media AS Content Hosting cache. The HTTP POST method shall be used for this purpose with a regular expression describing the media resource URLs to be purged provided in the body of the request. The message request body shall be encoded using the application/x-www-form-urlencoded MIME content type as a key–value pair, with the key being the string pattern and the value being the regular expression.

On receiving a purge request, the Media AF shall immediately invalidate all media resources in the Media AS cache matching the regular expression by declaring them as stale. A subsequent Media Client request at reference point M4 for a purged media resource will trigger the fetching (and possible caching) of the current version of the resource from the Media Application Provider's content origin via reference point M2 or from another Media AS via reference point M10 in case of a Pull-based ingest. For Push-based ingest, M4 requests for purged content shall be responded to with a 404 (Not Found) HTTP response until such time as a new version of the object is published by the Media Application Provider to the Media AS via at reference point M2 or from another Media AS via reference point M10.

If the procedure is successful, the Media AF shall return one of the following response messages:

- 204 (No Content) if no cache entries were purged, for example because no current cache entries matched the regular expression supplied in the original request. The response message body shall be empty in this case.

- 200 (OK) if some cache entries were purged. The body of the response message shall indicate the total number of cache entries purged in all Media AS instances distributing the content.

The HTTP response 400 (Bad Request) shall be returned in the case where the request message body – or the regular expression contained in it – are found by the Media AF to be syntactically malformed.

Content Publishing Configuration Provisioning (M1)

#### 5.2.9.2 Create Content Publishing Configuration resource operation

This operation is used by the Media Application Provider at reference point M1 to activate the Content Publishing feature for a particular Provisioning Session. The Media Application Provider shall use the HTTP POST method for this purpose. The request URL shall be a well-known sub-resource of the Provisioning Session resource, as specified in clause 8.9.2. The HTTP request message body shall be a Content Publishing Configuration resource representation, as specified in clause 8.9.3.1. There is at most one Content Publishing Configuration at a time for a given Provisioning Session.

Regarding the configuration of content egest from the Media AS to the Media Application Provider at reference point M2 or to another Media AS at reference point M10:

- If the Content Publishing Configuration uses the push-based content egest method, i.e., the EgestConfiguration.‌mode attribute is set to PUSH, then the EgestConfiguration.baseURL property shall be nominated by the Media Application Provider in the request message body. The Media AF shall return the EgestConfiguration.baseURL property value unchanged in its response message body.

- If the Content Publishing Configuration uses the pull-based content egest method, i.e., the EgestConfiguration.‌mode attribute is set to PULL, then the EgestConfiguration.baseURL property shall be nominated by the Media AF and returned in the response message body. It shall not be set by the Media Application Provider in the request message body.

Regarding the configuration(s) of content contribution by the Media Client to a Media AS service location at reference point M4 or from one Media AS to another at reference point M10:

- The Media Application Provider may define one or more contribution configurations in the contribution‌Configurations array within a Content Publishing Configuration. When more than one content contribution configuration is provided in the HTTP request message body, the operation to create the Content Publishing Configuration resource shall be successful if and only if all such contribution configurations are acceptable to the Media AF.

- As a side-effect of provisioning, the Media AF associates a Media AS service location exposed at reference point M4 or M10 with every contribution configuration. A service location may be associated with one or more physical endpoints at the discretion of the Media AF, subject to guidance from the Media Application Provider as described below.

NOTE: When HTTP [24] is used as the media delivery protocol at reference point M4 or M10, a service location is distinguished by a unique combination of protocol, authority (host name and port) and base path. The same service location may be associated with different physical endpoints using techniques such as anycast IP routing or DNS round-robin resolution.

- Every contribution configuration shall be assigned an identification label by the Media Application Provider, unique within the scope of the parent Content Publishing Configuration, in the ContributionConfiguration.‌contributionId property. This identification label may be referenced from other resources in the Provisioning Session, such as a Content Preparation Template (see clause 5.2.5).

- A contribution configuration may be configured to ingest content at either reference point M4 or M10. In all cases where the contribution configuration is configured to ingest content at reference point M4, the ContributionConfiguration.mode shall be set to PUSH.

- The Media Application Provider may use the ContributionConfiguration.‌affinityGroup property to indicate to the Media AF that the physical endpoint(s) realising the Media AS service location associated with a contribution configuration may or may not be co-located with those of another service location associated with another contribution configuration defined in the same Content Publishing Configuration. The physical endpoint(s) of the Media AS service locations associated with contribution configurations declaring different Contribution‌Configuration.‌affinityGroup values shall not be co-located.

- The ContributionConfiguration.‌canonicalDomainName and ContributionConfiguration.‌baseURL properties are:

- Read-only at reference point M1 in all cases where the ContributionConfiguration.mode is set to PUSH. The ContributionConfiguration.canonicalDomainName and ContributionConfiguration.baseURL shall always be omitted from the creation request and shall be assigned by the Media AF, allowing their values to be inspected by the Media Application Provider in the returned Content Publishing Configuration resource representation, or by using the operation specified in clause 5.2.9.3 below.

- Assigned by the Media Application Provider in all cases where ContributionConfiguration.‌mode is set to PULL. The Media AF shall return the Media AS ContributionConfiguration.canonicalDomainName and ContributionConfiguration.baseURL property values unchanged in its response body.

- If the ContributionConfiguration.‌certificateId property is present and valid, the Media AF shall assign a canonical domain name for the Media AS to expose at reference point M4 service locations that matches the Common Name and the first Subject Alternative Name in the referenced Server Certificate resource (taking into account wildcard matching) regardless of whether the corresponding X.509 certificate was created using the operation specified in clause 5.2.4.2 or those specified in clauses 5.2.4.3 and 5.2.4.4.

- The Media Application Provider may nominate an alternative domain name to be advertised to the Media Client in the Service Access Information by setting the ContributionConfiguration.‌domainNameAlias property when (and only when) creating the Content Publishing Configuration resource. If valid, the value of this property shall then appear in the Contribution‌Configuration.‌baseURL assigned by the Media AF instead of ContributionConfiguration.‌canonicalDomainName. The Media Application Provider shall ensure that this domain name alias resolves to the canonical domain name of the Media AS notified by the Media AF in its response by means of suitable DNS configuration.

When the push-based content egest is from a downstream Media AS to an upstream Media AS at reference point M10, the following applies in addition:

- The upstream Media AS Content Publishing Configuration shall be provisioned first. It may use either the push-based content egest method, i.e., EgestConfiguration.‌mode is set to PUSH, or the pull-based content egest method, i.e., EgestConfiguration.‌mode is set to PULL.

- The ContributionConfiguration.mode for the contribution configuration defined in the upstream Media AS Content Publishing Configuration that is intended to ingest content from the downstream Media AS shall be set to PUSH.

- The downstream Media AS Content Publishing Configuration shall be provisioned after the upstream Media AS using the push-based content egress method, i.e., EgestConfiguration.‌mode is set to PUSH.

- The EgestConfiguration.baseURL property shall be set by the Media Application Provider in the request message body to be the same value as the ContributionConfiguration.‌baseURL of the contribution configuration of the upstream Media AS Content Publishing Configuration intended to ingest content from the downstream Media AS.

When pull-based content egest is from a downstream Media AS to an upstream Media AS at reference point M10, the following applies in addition:

- The downstream Media AS Content Publishing Configuration shall be provisioned first using the pull-based content egress method, i.e., the EgestConfiguration.mode property shall be set to PULL.

- The upstream Media AS Content Publishing Configuration shall be provisioned after the downstream Media AS. It shall use the pull-based content egest method, i.e., the EgestConfiguration.mode attribute is set to PULL, and it shall contain at least one contribution configuration intended to serve the downstream Media AS at reference point M10. This contribution configuration shall use the pull-based content contribution method, i.e., the ContributionConfiguration.mode shall be set to PULL.

- The ContentConfiguration.‌baseURL property of the upstream Media AS Content Publishing Configuration for the contribution configuration intended to ingest content from the downstream Media AS shall be set by the Media Application Provider to be the EgestConfiguration.baseURL of the downstream Media AS Content Publishing Configuration that was nominated by the Media AF and returned in the response message body when the downstream Media AS Content Publishing Configuration was provisioned.

If the operation is successful, the Media AF shall return a 201 (Created) HTTP response message and the request URL shall be returned as the value of the Location HTTP header field. The response message body shall be a representation of the current state of the Content Publishing Configuration resource (see clause 8.9.3.1), including any properties assigned by the Media AF.

If any resources referenced by the supplied Content Publishing Configuration resource representation are invalid, the create operation shall fail with an HTTP response status code of 400 (Bad Request) and an error message body per clause 7.1.7. In this case, the Content Publishing Configuration resource shall remain in an uncreated state in the Media AF.

If ContributionConfiguration.‌domainNameAlias is set in the supplied Content Publishing Configuration resource representation but its value is not a syntactically valid Fully-Qualified Domain Name or if the ContributionConfiguration.‌certificateId property is absent or if the supplied domain name alias does match any of one of the Subject Alternative Names listed in the Server Certificate referenced by the ContributionConfiguration.‌certificateId property, the create operation shall fail with an HTTP response status code of 400 (Bad Request) and an error message body per clause 7.1.7. In this case, the Content Publishing Configuration resource shall remain in an uncreated state in the Media AF.

NOTE: Even if multiple contribution configurations in the same Content Publishing Configuration reference the same Server Certificate resource, they may each nominate a different domain name alias from among its Subject Alternative Names.

Attempting to create a Content Publishing Configuration in the scope of a Provisioning Session of any type other than MS\_UPLINK shall fail with an HTTP response status code of 403 (Forbidden) and an error message body per clause 7.1.7. In this case, the Content Publishing Configuration resource shall remain in an uncreated state in the Media AF.

If the request is acceptable but the Media AF is unable to provision the resources required by the supplied Content Publishing Configuration, the create operation shall fail with an HTTP response status code of 500 (Internal Server Error) and an error message body per clause 7.1.7. In this case, the Content Publishing Configuration resource shall remain in an uncreated state in the Media AF.

Service Access Information acquisition (M5, M3)

#### 5.3.2.1 General

Service Access Information is the set of parameters and addresses needed by the Media Client to activate reception of a downlink media delivery session, to activate an uplink media delivery session for content contribution or to obtain configuration parameters to initiate real-time media communication (RTC).

The Media Session Handler may obtain Service Access Information in one of two ways:

1. From the Media-aware Application via reference point M6. In this case, the Service Access Information is initially acquired by the Media-aware Application from the Media Application Provider via reference point M8 and the Media-aware Application shall pass the parameters to the Media Session Handler using one of the session launch mechanisms specified in clauses 11.2.2.1 and 6.

2. From the Media AF via reference point M5. In this case, the Service Access Information is derived by the Media AF from a Provisioning Session established at reference point M1 and the Media AF exposes this to the Media Session Handler using the operations specified in this clause. At the start of a media delivery session, a minimal set of baseline Service Access Information parameters is passed to the Media Session Handling using one of the session launch mechanisms specified in clauses 11.2.2.1 and 6 and this causes it to fetch the full Service Access Information from the Media AF using the procedure specified in clause 5.3.2.3.

The data model of the Service Access Information resource acquired by the Media Session Handler of the Media Client is specified in clause 9.2.3. The Service Access Information typically includes:

- For downlink media streaming according to TS 26.512 [6], a set of Media Entry Points that can be consumed by the Media Access Function. One of these is selected by the Media Session Handler or by the Media-aware Application and is handed to the Media Access Function via reference point M11 or M7 respectively.

- For uplink media according to TS 26.512 [6], a description of an entry point for the publishing of the uplink streaming content.

- For RTC according to TS 26.113 [7] specifies a configuration for the Media Client to assist in establishing interactive connectivity with other RTC session participants.

Service Access Information additionally includes configuration information to allow the Media Session Handler to invoke procedures for dynamic policy (see clause 5.3.3), network assistance (clause 5.3.4), QoE metrics reporting (clause 5.3.5) and consumption reporting (clause 5.3.6).

To support dynamic policy instantiation, Service Access Information shall include a Policy Template Binding for each Policy Template provisioned in the applicable Provisioning Session (see clause 5.2.7.1) populated as follows:

- The externalReference property shall be populated from the externalReference property of the corresponding Policy Template.

- The policyTemplateId property shall be populated from the policyTemplateId property of the corresponding Policy Template.

- The pduSetMarking property shall be present and set true if any member of the qoSSpecifictions array of the corresponding Policy Template has a pduSetMarking property set true.

- The downlink‌Data‌Burst‌Size‌Marking‌Required flag shall be present and set true if any member of the qoSSpecifictions array of the corresponding Policy Template has a downlink‌Data‌Burst‌Size‌Marking‌Required property set true.

- The downlink‌Time‌To‌Next‌Burst‌Marking‌Required flag shall be present and set true if any member of the qoSSpecifictions array of the corresponding Policy Template has a downlink‌Time‌To‌Next‌Burst‌Marking‌Required property set true.

- The downlink‌Expedited‌Transfer‌Indication‌Marking‌Required flag shall be present and set true if any member of the qoSSpecifictions array of the corresponding Policy Template has a downlink‌Expedited‌Transfer‌Indication‌Marking‌Required property set true

- The bdtWindows property shall be populated with a forward schedule of Background Data Transfer windows based on the bdtSpecification property of the corresponding Policy Template (if provisioned) and/or based on interactions between the Media AF and the PCF/NEF as specified in clause 5.5.3.

- If the l4S‌Enablement‌Preference property is present and set to true in a Policy Template to indicate that ECN marking for L4S functionality is preferred when it is instantiated, the corresponding Policy Template Binding shall include the l4S‌Enablement‌Preference flag set to the same value if the 5G System supports ECN marking for L4S functionality. Otherwise, the corresponding l4S‌EnablementPreference flag shall be omitted or set to false in the corresponding Policy Template Binding.

- If the qoSMonitoringConfiguration property is present in a Policy Template to indicate that QoS monitoring functionality is preferred when it is instantiated, the corresponding Policy Template Binding shall include the qoSMonitoring‌Enablement‌Preference flag set to true if the 5G System supports the QoS monitoring feature. Otherwise, the corresponding qoSMonitoring‌Enablement‌Preference flag shall be omitted or set to false in the corresponding Policy Template Binding.

NOTE: Before distributing the Service Access Information to the Media Session Handler, the Media AF may query the set of features supported by the 5G System as described in clause 6.6.2 of TS 29.500 [30].

If an Edge Resources Configuration with client-driven management (EM\_CLIENT\_DRIVEN) is provisioned in the applicable Provisioning Session (see clause 5.2.6), the Media AF shall convey a Client Edge Resources Configuration to the Media Session Handler as part of the Service Access Information it provides at reference point M5.

HTTP responses for successful and operation-specific failure cases are specified in the following clauses. For all other failure cases, an HTTP response indicating a response code in accordance with clause 7.1.6 shall be returned to the API client. In all failure cases a message body in accordance with clause 7.1.7 shall be included in the response message.

Dynamic Policy invocation (M3, M5)

#### 5.3.3.2 Create Dynamic Policy Instance resource operation

In order to instantiate a new dynamic policy, the Media Session Handler or Media AS (whichever is acting as Dynamic Policy invoker) shall first create a resource for the Dynamic Policy Instance in the Media AF. The Dynamic Policy invoker shall use the HTTP POST message for this purpose. The body of the HTTP POST message shall be a Dynamic Policy Instance resource representation that includes a Provisioning Session identifier, the resource identifier of the target Policy Template and a set of Service Data Flow descriptions identifying the application flow(s) to be policed.

1. The provisioningSessionId property associates the Dynamic Policy Instance resource with a Provisioning Session.

2. The policyTemplateId property uniquely identifies the Policy Template on which the Dynamic Policy Instance is based.

3. For each application flow to be managed by the Dynamic Policy Instance resource, an instance of the Application‌Flow‌Binding object shall be present in the application‌Flow‌Bindings array. The applicationFlow‌Description property of this object shall be populated by the Dynamic Policy invoker and shall declare a Service Data Flow template according to TS 23.503 [17] that describes application flow in question. Exactly one of the following filtering specifications shall be populated in the Application‌FlowDescription object to identify traffic belonging to a media delivery application flow:

- a packetFilter object (including 5-tuples, Type of Service, Security Parameter Index, etc.). A Media Client shall not attempt to instantiate more than one Dynamic Policy Instance at the same time that cites the same set of packet filters*.*

- a domainName populated with the fully-qualified Internet domain name of a Media AS at reference point M4*.* A Media Client shall not attempt to instantiate more than one Dynamic Policy Instance at the same time that cites the same domainName*.*

In addition, the top-level media type of the application flow may be declared in the mediaType property.

When the policy binding for the chosen Policy Template indicates that PDU Set marking is enabled (i.e., the pduSetMarking flag is set to true in Service Access Information), the Dynamic Policy invoker shall also populate the mediaTransportParameters property with the media transport protocol parameters to be used by the Media Access Function on the application flow in question to label uplink PDUs belonging to the same PDU Set and/or to indicate the last PDU in each PDU Set and/or to indicate the end of a data burst comprising one or more PDU Sets.

When the policy binding for the chosen Policy Template indicates that PDU Set marking is not enabled (i.e., the pduSetMarking flag is set to false in Service Access Information) but specific QoS handling based on PDU Sets is nevertheless desired, the Dynamic Policy invoker shall also populate the mediaTransportParameters property with the media transport protocol parameters to be used by the Media Access Function on the application flow in question to indicate the RTP payload information for uplink PDUs which can be used to derive the PDU Set information.

NOTE: RTP payload information includes the RTP payload type and RTP payload format. The corresponding data type RtpPayloadInfo is specified in clause 5.5.4.15 of TS 29.571 [33].

When the policy binding for the chosen Policy Template indicates that PDU Set marking is enabled (i.e., the pduSetMarking flag is set to true in Service Access Information), the Dynamic Policy invoker shall also populate the mediaTransportParameters property with the media transport protocol parameters to be used by the Media AS on the application flow in question to label downlink PDUs belonging to the same PDU Set and/or to indicate the last PDU in each PDU Set and/or to indicate the end of a data burst comprising one or more PDU Sets, as well as to indicate the desired PDU Set Importance (PSI) value for N6-unmarked downlink PDUs on the application flow in question.

When the policy binding for the chosen Policy Template indicates that PDU Set marking is not required (i.e., the pduSetMarking flag is set to false in Service Access Information) but specific QoS handling based on PDU Sets is nevertheless desired, the Dynamic Policy invoker shall also populate the mediaTransportParameters property with the media transport protocol parameters to be used by the Media AS on the application flow in question to indicate the RTP payload information for downlink PDUs which can be used to derive the PDU Set information, as well as to indicate the desired PDU Set Importance (PSI) value for N6-unmarked downlink PDUs on the application flow in question.

When the policy binding for the chosen Policy Template indicates that data burst size marking is enabled (i.e., downlink‌Data‌Burst‌Size‌Marking‌Required is set to true in Service Access Information), the Dynamic Policy invoker shall also populate the media‌Transport‌Parameters property with the media transport protocol parameters to be used by the Media AS on the application flow in question to label downlink PDUs belonging to the same data burst with the size of that data burst.

When the policy binding for the chosen Policy Template indicates that time to next burst marking is enabled (i.e., downlink‌Time‌To‌Next‌Burst‌Marking‌Required is set to true in Service Access Information), the Dynamic Policy invoker shall also populate the media‌Transport‌Parameters property with the media transport protocol parameters to be used by the Media AS on the application flow in question to label downlink PDUs belonging to the same data burst with the predicted time to the next burst.

When the policy binding for the chosen Policy Template indicates that expedited transfer indication marking is enabled (i.e., downlink‌Expedited‌Transfer‌Indication‌Marking‌Required is set to true in Service Access Information), the Dynamic Policy invoker shall also populate the media‌Transport‌Parameters property with the media transport protocol parameters to be used by the Media AS on the application flow in question to label downlink PDUs with the expedited transfer indication.

When the policy binding for the chosen Policy Template indicates that expedited transfer indication marking is enabled (i.e., downlink‌Expedited‌Transfer‌Indication‌Marking‌Required is set to true in Service Access Information), the Dynamic Policy invoker shall also populate two Application‌Flow‌Binding objects in the application‌Flow‌Bindings array, one with the downlinkExpeditedTransferIndication set to true and the other with this property set to false. The remainder of application‌Flow‌Description properties of the two Application‌Flow‌Binding objects shall be populated identically and shall declare the same Service Data Flow template describing the same application flow for which expedited transfer indication marking is sometimes desired.

When multiple media streams are multiplexed into a single application flow, the Dynamic Policy invoker may also populate the uplink‌multiplexed‌Media‌Infos and downlink‌Multiplexed‌Media‌Infos properties (as applicable) with the *media identification information* parameters to be used by the 5G System for traffic detection and differentiated QoS on the uplink and downlink respectively. The population of objects in these arrays is not further specified in the present document.

- For uplink-only application flows, including those terminating on a Media AS, the downlink‌Multiplexed‌Media‌Infos property shall be omitted.

- For downlink-only application flows, including those originating from a Media AS, the uplink‌Multiplexed‌Media‌Infos property shall be omitted.

- For application flows carrying multiplexed media flows between two Media Clients (i.e., uplink followed by downlink via the UPF at reference point M12 or via Media AS at reference point M4), both the uplink‌Multiplexed‌Media‌Infos and downlink‌Multiplexed‌Media‌Infos properties shall be present. The population of these two arrays may be further constrained by the media delivery system.

4. When the Dynamic Policy invoker attempts to activate a QoS-related Policy Template, the qosSpecification property shall also be present in the Application‌Flow‌Binding object containing the following properties specified in clause 7.3.3.6 to describe the QoS requirements of the media application flows described by the bound applicationFlowDescription property:

- downlinkBitRates shall indicate the maximum requested bit rate, minimum desired bit rate and minimum requested bit rate in the downlink direction.

- uplinkBitRates shall indicate the maximum requested bit rate, minimum desired bit rate and minimum requested bit rate in the uplink direction.

- desiredPacketLatency may indicate the desired packet latency in both the downlink and uplink directions.

- desiredPacketLossRate may indicate the desired packet loss rate in both the downlink and uplink directions.

- desiredDownlinkPduSetQosParameters may be populated to indicate the desired delay budget and error rate for PDU Sets in the downlink direction, as well as indicating whether the loss of a single PDU in a PDU Set is significant for the receiving application.

- downlink‌Expedited‌Transfer‌Indication may be populated and shall be set to true for QoS requirements that apply to application flows requiring expedited transfer from the network in both uplink and downlink directions. When downlink‌Expedited‌Transfer‌Indication is set to true, the downlink‌Bit‌Rates and uplink‌Bit‌Rates properties shall be populated identically. If downlink‌Expedited‌Transfer‌Indication is omitted or set to false, the QoS requirements apply to non-expedited transfer.

- The l4SRequired flag may be set to true to require that ECN marking for L4S is enabled in the 5G System for the media delivery session. It is an error to create a Dynamic Policy with this feature required unless the l4SEnablement‌Preference property (see clause 5.2.7.1) is present and set to true in the Policy Template.

- The qoSMonitoring‌Required flag may be set to true to require that QoS monitoring is enabled in the 5G System for the media delivery session. It is an error to create a Dynamic Policy with this feature required unless the qoSMonitoring‌Configuration property (see clause 5.2.7.1) is present in the Policy Template.

5. When the Dynamic Policy invoker instantiates a Policy Template that is provisioned with a Background Data Transfer (BDT) specification per clause 5.2.7.1, the bdtSpecification property shall be present and it shall contain the following properties:

- estimatedDataTransferVolume, indicating the data volume that the Media Client estimates it will use during the current Background Data Transfer time window.

- Each object (see clause 7.3.3.14) conveyed in the windows array indicates a time window over which Background Data Transfers are requested by the Dynamic Policy invoker from those offered in the dynamic policy configuration of the Service Access Information resource (see clause 5.3.2.1).

- Each such window may additionally indicate the maximum bit rate for Background Data Transfers in the downlink and uplink directions that the Dynamic Policy invoker is bidding for in (respectively) the maximimumDownlinkBitRate and maximimumUplinkBitRate properties. In response, the Media AF populates these properties with the maximum permitted bit rate for Background Data Transfers in the downlink and uplink directions respectively when the dynamic policy is in force.

6. When the 5G System employs a traffic enforcement function to ensure that traffic complies with the policy described by the qosSpecification property, the Media AF shall explicitly indicate this in the Dynamic Policy resource representation by setting the qosEnforcement property to true.

If the operation is successful, the Media AF shall create a new Dynamic Policy Instance resource. In this case, the Media AF shall return a 201 (Created) HTTP response message to the Dynamic Policy invoker, and the URL of the newly created Dynamic Policy Instance resource, including its resource identifier, shall be provided as the value of the Location HTTP header field. The response message body shall be a representation of the current state of the Dynamic Policy Instance resource (see clause 9.3.3.1), including any properties assigned by the Media AF.

- The l4sEnabled property in the response message body shall be populated with the enablement status of ECN marking for L4S functionality in the 5G System.

- The qosMonitoringEnabled property in the response message body shall be populated with the enablement status of QoS monitoring in the 5G System.

Upon successful creation of the Dynamic Policy Instance resource, notifications of updates to the resource may be notified asynchronously to the Dynamic Policy invoker:

- If the notificationURL property is present in the Service Access Information, the Dynamic Policy invoker shall subscribe to the MQTT sub-topic corresponding to the resourceId of the Dynamic Policy Instance and shall expect to receive asynchronous notifications published by the Media AF on the MQTT notification channel of type NOTIFICATION\_‌DYNAMIC\_‌POLICY\_‌INSTANCE concerning changes to the Dynamic Policy Instance, including details about new Background Data Transfer opportunities.

- The Media AF shall use the MQTT notification channel signalled in the Service Access Information (if any, see clause 5.3.2.3) to notify the Dynamic Policy invoker subscriber about updates to the Dynamic Policy Instance resource. A notification message of type NOTIFICATION\_‌DYNAMIC\_‌POLICY\_‌INSTANCE shall be published to the MQTT sub-topic corresponding to the resourceId of the Dynamic Policy Instance.

The usage and message formats for the MQTT notification channel are specified in clause 10.2.

When the Dynamic Policy Instance is successfully instantiated, the Media AF triggers the creation of a corresponding PCC rule in the 5G System according to clause 5.5.3 to enforce the required QoS and/or charging policy on the specified application flow(s). Depending on the ApplicationFlowDescription objects in the received Dynamic Policy Instance resource representation and the filterMethod indicated by each one, the Media AF shall populate for each one a flowDescription object and/or provide an Application Identifier referring to a PFD (Packet Flow Description) object containing the domain name of a Media AS instance.

NOTE: When the Media AF is deployed in an external Data Network, it is the responsibility of the NEF to map any external Application Identifier supplied by the Media AF into an internal Application Identifier that is known to the PCF.

If the supplied Dynamic Policy Instance is not acceptable to the Media AF, the create operation shall fail with an HTTP response status code of 400 (Bad Request) and an error message body per clause 7.1.7. In this case, the Dynamic Policy Instance resource shall remain in an uncreated state in the Media AF.

If the request is acceptable but the Media AF forbids the instantiation of the referenced Policy Template, for example because the quota for Background Data Transfers has been exceeded or because the UE is not permitted in the charging specification, the create operation shall fail with an HTTP response status code of 403 (Forbidden) and an error message body per clause 7.1.7. In this case, the Dynamic Policy Instance resource shall remain in an uncreated state in the Media AF.

If the request is acceptable but the Media AF is unable to provision the resources required by the supplied Dynamic Policy Instance, the create operation shall fail with an HTTP response status code of 500 (Internal Server Error) and an error message body per clause 7.1.7. In this case, the Dynamic Policy Instance resource shall remain in an uncreated state in the Media AF.

If the Dynamic Policy invoker needs to instantiate several dynamic policies, it may invoke this operation as often as needed.

Network Media Session Handling (M3, M5) interactions  
Metrics Reporting

#### 5.3.5.1 Procedures

These procedures are used by the Media AS at reference point M3 or else by the Metrics Reporting functions of the Media Client and subsequently by the Media Session Handler at reference point M5 to submit a metrics report to one of the Media AF instances listed in the client metrics reporting configuration of the Service Access Information resource previously retrieved using the procedure in clause 5.3.2.3.

- When the metrics collection and reporting feature is provisioned for media delivery sessions using the operations specified in clause 5.2.11, one or more client metrics reporting configurations, each associated with a provisioned Metrics Reporting Configuration, shall be provided to the Media Session Handler and the Media AS (both acting in this case as metrics reporting entity) in the Service Access Information.

- When the metrics collection and reporting feature is provisioned for RTC sessions using the operations specified in clause 5.2.11, one or more client metrics reporting configurations, each associated with a provisioned Metrics Reporting Configuration, shall be provided to the Media Session Handler and the Media AS (both acting in this case as metrics reporting entity) in the Service Access Information.

A given client metrics reporting configuration contains information including:

1. The subset of metrics from the provisioned metrics scheme to be collected and reported by the metrics reporting entity;

2. The frequency at which these metrics are to be sampled by the metrics reporting entity;

2a. Thresholds for certain metrics, the crossing of which drives their reporting by the metrics reporting entity;

2b. The locations of the Media Client (or remote peer outside the Media Delivery System) where metrics collection is requested;

NOTE: When the metrics reporting entity is a Media AS, it may be aware of changes to the location of a remote peer outside the Media Delivery System.

3. The proportion of media delivery sessions for which metrics reports are to be sent by the metrics reporting entity;

4. The portion of the media session (represented by start offset and/or duration parameters) for which metrics reports are to be sent by the metrics reporting entity if reporting is enabled for that media delivery session;

5. The interval at which metrics reports are to be sent by the metrics reporting entity if reporting is enabled for a media delivery session; and

6. The Media AF address(es) to which metrics reports are to be sent.

Furthermore:

- Before a media delivery session is started, the metrics reporting entity shall check if the Service Access Information includes any Client Metrics Reporting Configurations. If any such configurations are present, the metrics reporting entity shall initiate the metrics reporting procedure for the media delivery session based on these configurations.

- During the course of the media delivery session, the metrics reporting entity shall periodically check if any Metrics Reporting Configurations have been added to or removed from the Service Access Information and shall activate or deactivate the metrics reporting procedure as appropriate for the media delivery session in question.

The data type of the Metrics Reporting Configuration signalled as part of the Service Access Information indicating at reference point M5 is specified in clause 9.2.3.

The metrics reporting entity shall decide whether to activate the metrics reporting procedure for a particular media delivery session at the start of that session and whenever any Client Metrics Reporting Configuration changes in the related Service Access Information.

- When the samplePercentage property in a Metrics Reporting Configuration has a value of 100 percent, the metrics reporting entity shall activate the metrics reporting procedure for that configuration.

- If the samplePercentage value in a Metrics Reporting Configuration is less than 100 percent, the metrics reporting entity shall generate a random number which is uniformly distributed in the range of 0 to 100, and the metrics reporting entity shall activate the metrics reporting procedure for the Metrics Reporting Configuration when the generated random number is of a lower value than the samplePercentage value.

If the metrics reporting procedure is activated for a particular Client Metrics Reporting Configuration, the metrics reporting entity shall produce and submit a metrics report to the Media AF using the procedure specified in clause 5.3.5.2 when any of the following conditions are met:

- On determining the need to report ongoing QoE metrics for a media delivery session at periodic intervals determined by the reportingInterval property in the Client Metrics Reporting Configuration, provided that both of the following hold:

- The time offset indicated in the reportingStartOffset property of the Client Metrics Reporting Configuration has passed since the start of the media delivery session; and

- The time offset indicated in the reportingDuration property of the Client Metrics Reporting Configuration has not yet passed since the time offset indicated in the reportingStartOffset property.

- At the end of the media delivery session.

Whenever a metrics report is produced for a given client metrics reporting configuration, the metrics reporting entity shall reset its reporting interval timer for that configuration to the value of the clientMetrics‌Reporting‌Configurations[].‌reportingInterval property and it shall begin countdown of the timer again. When the media delivery session comes to an end, the metrics reporting entity shall disable its reporting interval timer for all client metrics reporting configurations.

Details of the APIs supporting these procedures at reference points M3 and M5 are specified in clause 9.5.

HTTP responses for successful and operation-specific failure cases are specified in the following clauses. For all other failure cases, an HTTP response indicating a response code in accordance with clause 7.1.6 shall be returned to the API client. In all failure cases a message body in accordance with clause 7.1.7 shall be included in the response message.

#### 5.3.5.2 Submit metrics report operation

This operation is used by the Media Session Handler or Media AS (whichever is acting as metrics reporting entity) to submit a metrics report to the Media AF. If several Media AF addresses are listed in the serverAddresses array of the client metrics reporting configuration (see table 9.2.3.1-1), the metrics reporting entity shall choose one at random and shall send the metrics report to the selected server endpoint. The HTTP POST method shall be used for this purpose, citing the address of the chosen Media AF in the request URL. The request body shall be formatted according to the metrics scheme indicated in scheme property of one of the Client Metrics Reporting Configurations (see clause 5.3.2.3 and table 9.2.3.1-1) and the Content-Type HTTP request header set accordingly. Details of individual metrics reporting schemes and their corresponding metrics report formats are beyond the scope of the present document, but the JSON-based metrics reporting envelope specified in clause 9.5.3.2 should be extended in preference when specifying new metrics report formats by adding new properties to the MetricsSample data type.

A reporting client identifier should be included in the metrics report if the metrics scheme supports carriage of this data. Metrics schemes designed for use with this operation should specify a means to convey a reporting client identifier. If available to the metrics reporting entity, its value should be a GPSI value as defined by TS 23.003 [16]. Otherwise, the reporting client identifier should be represented by a stable and globally unique string.

If the HTTP request is acceptable but the Media AF has not yet fully processed the submitted metrics report, the Media AF may return a 202 (Accepted) HTTP response message with an empty body and process the report later.

If the operation is otherwise successful, the Media AF shall return a 200 (OK) HTTP response message with an empty body to acknowledge successful processing of the metrics report.

If metrics reporting is not provisioned for the Provisioning Session in question, the Media AF shall return a 403 (Forbidden) HTTP response message with an error message body per clause 7.1.7 and the Media AF shall not process the submitted report.

If the HTTP request message indicates a MIME content type in the Content-Type request header that is not consistent with one of the provisioned metrics reporting schemes, the Media AF shall return a 415 (Unsupported Media Type) HTTP response message with an error message body per clause 7.1.7 and shall not process the submitted metrics report.

If the target Media AF endpoint is temporarily unable to accept the submitted metrics report (e.g. because it is overloaded), it shall return a 503 (Service Unavailable) HTTP response message with an empty body. The optional HTTP response header Retry-After should be included in such a response, indicating when the Media AF expects to be able to accept new submissions. In this case, the metrics reporting entity should store outstanding metrics reports and reattempt submission when the endpoint later becomes available. Details are left to implementation.

UE media session handling (M6, M11) interactions

5.4.3 Dynamic Policy invocation

At the start of a media delivery session, the Media Session Handler shall determine the external reference and target QoS parameters of the initial Service Operation Point by invoking an appropriate API method on the Media Session Handler at reference point M11. In addition, the Media Session Handler may interrogate the capabilities of the Media Access Function. Based on the parameter values supplied, the Media Session Handler shall attempt to instantiate a Dynamic Policy satisfying the Media Access Function’s requirements using the operation specified in clause 5.3.3.2 if the target QoS lies within the bounds of a Policy Template with the corresponding external reference advertised in the Service Access Information for the media delivery session.

The Media Session Handler shall subscribe to receive notifications from the Media Access Function at reference point M11 of changes to the Service Operation Point during the course of the media delivery session. When such a change occurs (e.g., when the Media Access Function selects a different MPEG‑DASH Representation), the Media Access Function shall send a notification to the Media Session Handler at reference point M11 citing the external reference and target QoS parameters of the new Service Operation Point. If the QoS of the new Service Operation Point is not satisfied by the currently instantiated Dynamic Policy, the Media Session Handler shall attempt to instantiate a Dynamic Policy satisfying the Media Access Function’s requirements using the operation specified in clause 5.3.3.2 if the target QoS lies within the bounds of a Policy Template with the corresponding external reference advertised in the Service Access Information for the media delivery session.

The Media-aware Application shall subscribe to receive notifications from the Media Session Handler at reference point M6 concerning Background Data Transfer opportunities. When such an opportunity is announced to the Media Session Handler by the Media AF at reference point M5, the Media Session Handler shall send a corresponding notification to the Media-aware Application at reference point M6 that includes an estimate of the opportunity window. If it wishes to avail itself of the Background Data Transfer opportunity, the Media-aware Application shall invoke a suitable API method on the Media Session Handler at reference point M6, providing an estimate of the data volume it intends to transfer over reference point M4. The Media Session Handler shall then attempt to instantiate a Dynamic Policy with Background Data Transfer network characteristics (including the data volume estimate supplied by the Media-aware Application) using the operation specified in clause 5.3.3.2 if a suitable Policy Template is advertised in the Service Access Information for the media delivery session.

If the Media Access Function supports an L4S protocol stack, it shall subscribe to receive notifications from the Media Session Handler at reference point M11 concerning successful instantiation of Policy Templates that have ECN marking for L4S functionality enabled. When successful instantiation of such a Policy Template is confirmed to the Media Session Handler by the Media AF at reference point M5, the Media Session Handler shall send the L4S\_ENABLED notification to the Media Access Function at reference point M11 (see table 11.3.2-2) to inform it that ECN marking for L4S functionality has been successfully enabled for the corresponding media delivery session. The Media Access Function shall then enable ECN marking for L4S functionality.

If the Media Access Function is capable of consuming QoS monitoring results, it shall subscribe to receive notifications from the Media Session Handler at reference point M11 concerning successful instantiation of Policy Templates that have QoS monitoring enabled. When successful instantiation of such a Policy Template is confirmed to the Media Session Handler by the Media AF at reference point M5, the Media Session Handler shall send the QOS\_‌MONITORING\_‌ENABLED notification to the Media Access Function at reference point M11 (see table 11.3.2-2) to inform it that QoS monitoring is enabled for the corresponding media delivery session. On receipt of such a confirmation, the Media Access Function shall subscribe to receive notifications from the Media Session Handler at reference point M11 concerning the QoS monitoring results. When QoS monitoring results are notified to the Media Session Hander by the Media AF at reference point M5 (via the asynchronous MQTT notification channel for the Dynamic Policy instance – see clause 5.3.3.2), the Media Session Hander shall send a QOS\_‌MONITORING\_‌RESULTS notification to the Media Access Function at reference point M11 (see table 11.3.2-2). The Media Access Function may use the provided QoS monitoring results to adjust its media delivery behaviour at reference point M4.

Policy control interactions for Dynamic Policies (N5/N33)

##### 5.5.3.3.3 Mapping of dynamic traffic characteristics parameters

NOTE: Handling of dynamically changing traffic characteristics by the 5G Core at reference point M12 is for future study.

When the Media AF directly invokes the Npcf\_PolicyAuthorization service at reference point N5 according to TS 29.514 [18], the Media‌Component object in the PCF at reference point N5 associated with the Application‌Flow‌Binding shall be populated as follows by the Media AF to enable downlink dynamic traffic characteristics detection by the 5G Core based on PDU markings present in the media transport at reference point M4 only:

* If the downlinkDataBurstSizeMarkingRequired property is present and true in the qosSpecification property of the Policy TemplateqosSpecifications, then the Media‌Component.‌dat‌Burst‌Size‌Ind property shall be populated by the Media AF at reference point N5 with the same value.
* If the downlinkTimeToNextBurstMarkingRequired property is present and true in the qosSpecification property of the Policy Template qosSpecifications, then the Media‌Component.‌time‌to‌Next‌Burst‌Ind property shall be populated by the Media AF at reference point N5 with the same value.
* If the downlinkExpeditedTransferIndicationRequired property is present and true in the qosSpecification property of the Policy Template qosSpecifications, and the downlink‌Expedited‌Transfer‌Indication is present in an ApplicationFlowBinding.‌qosSpecification object of a DynamicPolicy resource instantiating the Policy Template, then for a correspondingMediaComponent at reference point N5, the Media‌Component.‌exp‌Tran‌Ind property shall be populated by the Media AF at reference point N5 with the same value as the downlink‌Expedited‌Transfer‌Indication.

When the Media AF invokes the Nnef\_AFsessionWithQoS service at reference point N33 according to TS 29.522 [19] and TS 29.122 [20], the AsSessionWithQoSSubscription resource at reference point N33 shall be populated as follows by the Media AF to enable downlink dynamic traffic characteristics detection by the 5G Core based on PDU markings present in the media transport at reference point M4 only:

* If the downlinkDataBurstSizeMarkingRequired property is present and true in the qosSpecification property of the Policy Template qosSpecifications, then the AsSessionWithQoSSubscription.‌dat‌Burst‌Size‌Ind property shall be populated by the Media AF at reference point N33 with the same value.
* If the downlinkTimeToNextBurstMarkingRequired property is present and true in the qosSpecification property of the Policy Template qosSpecifications, then the AsSessionWithQoSSubscription.‌time‌to‌Next‌Burst‌Ind property shall be populated by the Media AF at reference point N33 with the same value.
* If the downlinkExpeditedTransferIndicationRequired is present and true in the qosSpecification property of the Policy Template qosSpecifications, and the downlink‌Expedited‌Transfer‌Indication is present in anApplicationFlowBinding.‌qosSpecification object of a DynamicPolicy resource instantiating the Policy Template, then for a corresponding AsSessionWithQoSSubscription at reference point N33, the AsSession‌With‌QoS‌Subscription.exp‌Tran‌Ind property shall be populated by the Media AF at reference point N33 with the same value as thedownlink‌Expedited‌Transfer‌Indication.

##### 5.5.3.3.4 Mapping of multiplexed media flow information

When the Media AF directly invokes the Npcf\_PolicyAuthorization service at reference point N5 according to TS 29.514 [18], the Media‌Component object in the PCF at reference point N5 associated with the Application‌Flow‌Binding shall be populated as follows by the Media AF to enable multiplexed media traffic identification by the 5G Core based on media identification information present in the media transport at reference point M4 or M12:

- When Application‌Flow‌Description.‌uplink‌Multiplexed‌Media‌Infos and/or Application‌Flow‌Description.‌downlink‌Multiplexed‌Media‌Infos properties are present for an application data flow, the Media‌Component.‌medSubComps array shall include a MediaSubComponent object describing each media stream of the application data flow at reference point N5. The MediaSubComponent of a media flow shall be populated as follows:

- The marBwDl and marBwUl properties shall be set to the maximum requested bit rate for this media flow in the downlink and uplink directions respectively.

- The mpxMediaUlInfos array shall be populated with a copy of the corresponding MpxMediaInfo objects provided in Application‌Flow‌Description.‌uplink‌Multiplexed‌Media‌Infos.

- The mpxMediaDlInfos array shall be populated with a copy of the corresponding MpxMediaInfo objects provided in Application‌Flow‌Description.‌downlink‌Multiplexed‌Media‌Infos.

When the Media AF invokes the Nnef\_AFsessionWithQoS service at reference point N33 according to TS 29.522 [19] and TS 29.122 [20], the multiModDatFlows property ofAsSessionWithQoSSubscription resource at reference point N33 shall be populated as follows by the Media AF to enable multiplexed media traffic identification by the 5G Core based on media identification information present in the media transport at reference point M4 or M12:

- When Application‌Flow‌Description.‌uplink‌multiplexed‌Media‌Infos and/or Application‌Flow‌Description.‌downlink‌multiplexed‌Media‌Infos properties are present for an application data flow, a separate AsSessionMediaComponent object shall be used to describe each media stream of the application data flow at reference point N33 and this object shall be populated as follows:

- The marBwDl and marBwUl properties shall be set to the maximum requested bit rate for the media flow in the downlink and uplink directions respectively.

- The flowInfos array shall include a single FlowInfo object describing the media flow that shall be populated as follows:

- The mpxMediaUlInfos array shall be populated with a copy of the corresponding MpxMediaInfo objects provided in Application‌Flow‌Description.‌uplink‌multiplexed‌Media‌Infos.

- The mpxMediaDlInfos array shall be populated with a copy of the corresponding MpxMediaInfo objects provided in Application‌Flow‌Description.‌downlink‌multiplexed‌Media‌Infos.

#### 5.5.3.3A Mapping other Policy Control features

##### 5.3.3.3A.1 Enabling ECN marking for L4S

When instantiating a Policy Template that includes the l4SEnablement‌Preference property set to *true*, the Media AF shall enable ECN marking for L4S functionality in the 5G System by invoking the Npcf\_‌PolicyAuthorization\_‌Create service operation at reference point N5 (see clause 4.2.2 of TS 29.514 [18]) or the Nnef\_‌AFsessionWithQoS\_‌Create service operation at reference point N33 (see clause 5.14 of TS 29.122 [20]) for the media application flow(s) described by the Dynamic Policy Instance.

##### 5.3.3.3A.2 Enabling QoS monitoring

When instantiating a Policy Template that includes aqoSMonitoring‌Configuration property, the Media AF shall enable QoS monitoring in the 5G System by invoking theNpcf\_‌PolicyAuthorization\_‌Create service operation on the PCF at reference point N5 (see clause 4.2.2 of TS 29.514 [18]) or the Nnef\_‌AFsessionWithQoS\_‌Create service operation on the NEF at reference point N33 (see clause 5.14 of TS 29.122 [20]), including the QoSMonitorConfig object from the Policy Template as a parameter.

5.5.3.4 Subscription to PCF notifications

For each of the Dynamic Policy Instances it is managing, the Media AF shall subscribe to the following PCF notifications on the corresponding AF application session context:

- Service Data Flow QoS notification control;

- Service Data Flow deactivation;

- Resources allocation outcome;

- Service Data Flow L4S enablement;

- Service Data Flow QoS monitoring enablement;

- Service Data Flow QoS monitoring results.

For each of the Dynamic Policy Instances it is managing with QoS monitoring successfully enabled in the 5G System, the Media AF may subscribe to the following notifications from a local UPF managing the corresponding application data flow(s) using the Nupf\_EventExposure service specified in clause 6.1 of TS 29.564 [52]:

- Service Data Flow QoS monitoring results.

NOTE: In this context, "local UPF" refers to a UPF instance inserted for local access, for example in the case where the Media AS is deployed as an EAS instance in the Edge DN. In order to reduce the latency of exposing QoS monitoring results, the local UPF provides network status notifications directly to the 5GMd AF (or via a locally deployed NEF) as defined in clause 5.8.2.17 of TS 23.501 [2].

Structured data types

#### 7.3.3.2 ApplicationFlowDescription type

This data type is used to declare the properties of an application data flow to the Media AF during the course of a media delivery session. Its properties are used to describe a Service Data Flow to the 5G Core for the purpose of application traffic detection.

Table 7.3.3.2-1: Definition of type ApplicationFlowDescription

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data type | Cardinality | Description |
| filterMethod | SdfMethod | 1..1 | The filtering method used to identify packets belonging to this application flow (see clause 7.3.4.2). |
| packetFilter | IpPacketFilterSet | 0..1 | Description of the application flow in terms of packet header field values (see below). |
| domainName | string | 0..1 | Description of the application flow in terms of the Fully-Qualified Domain Name (FQDN) of the Media AS targeted at reference point M4 (see below). |
| mediaType | MediaType | 0..1 | The type of media carried by this application flow (see NOTE 1). |
| mediaTransport‌Parameters | Protocol‌Description | 0..1 | The set of media transport protocol parameters to be used by the 5G Core for the purpose of PDU Set identification and/or end of data burst detection on this application flow (see NOTE 2). |
| uplink‌Multiplexed‌Media‌Infos | array(Mpx‌Media‌Info) | 0..N | The list of media identification information parameters to be used by the 5G Core for the purpose of uplink multiplexed media identification on this application flow (see NOTE 3). |
| downlink‌Multiplexed‌MediaInfos | array(Mpx‌Media‌Info) | 0..N | The list of media identification information parameters to be used by the 5G Core for the purpose of downlink multiplexed media identification on this application flow (see NOTE 3). |
| NOTE 1: Enumeration MediaType is specified in clause 5.6.3.3 of TS 29.514 [18].  NOTE 2: Data type ProtocolDescription is specified in clause 5.5.4.13 of TS 29.571 [33].  NOTE 3: Data type MpxMediaInfo is specified in clause 5.6.2.61 of TS 29.514 [18]. | | | |

Exactly one of the following properties shall be populated: packetFilter, domainName.

#### 7.3.3.4 PolicyConstraints type

This data type is used to specify permitted ranges of QoS parameters and/or to mandate the use of certain QoS features of the 5G System.

Table 7.3.3.4-1: Definition of type PolicyConstraints

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data type | Cardinality | Description |
| component‌Reference | string | 1..1 | A unique string identifying this QoS specification within the scope of its parent. |
| qosReference | string | 0..1 | As specified in clause 5.6.2.7 of TS 29.514 [18]. |
| downlink‌Qos‌Specification | Unidirectional‌Qos‌Specification | 0..1 | QoS specification in the downlink direction (see below and clause 7.3.3.3). |
| uplink‌Qos‌Specification | Unidirectional‌Qos‌Specification | 0..1 | QoS specification in the uplink direction (see below and clause 7.3.3.3). |
| pdu‌Set‌Marking | boolean | 0..1 | Indicates that packets at reference point M4 are required to include PDU Set marking if the media transport protocol supports this.  Default value false if omitted. |
| downlink‌Data‌Burst‌Size‌Marking‌Required | boolean | 0..1 | Indicates that downlink packets at reference point M4 are required to include data burst size marking if the media transport protocol supports this.  Default value false if omitted. |
| downlink‌Time‌To‌Next‌Burst‌Marking‌Required | boolean | 0..1 | Indicates that downlink packets at reference point M4 are required to include time to next burst marking if the media transport protocol supports this.  Default value false if omitted. |
| downlink‌Expedited‌Transfer‌Indication‌Marking‌Required | boolean | 0..1 | Indicates that downlink packets at reference point M4 are required to include expedited transfer indication marking if the media transport protocol supports this.  Default value false if omitted. |

At least one of the following properties shall be populated: qosReference, downlink‌Qos‌Specification, uplink‌Qos‌Specification.

#### 7.3.3.6 ClientPolicySpecification type

Table 7.3.3.6-1: Definition of type ClientPolicySpecification

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data type | Cardinality | Description |
| downlinkBitRates | Unidirectional‌Bit‌Rate‌Specification | 1..1 | Bit rate specification for the downlink direction (see clause 7.3.3.5). |
| uplinkBitRates | Unidirectional‌Bit‌Rate‌Specification | 1..1 | Bit rate specification for the uplink direction (see clause 7.3.3.5). |
| desiredPacketLatency | number | 0..1 | Desired packet latency in milliseconds, expressed as a positive floating-point value (see NOTE 1). |
| desiredPacketLossRate | Packet‌Loss‌Rate | 0..1 | Desired packet loss rate expressed in tenths of a percent (see NOTE 1). |
| desiredDownlinkPduSetQosParameters | PDUSet‌Qos‌Para | 0..1 | Desired PDU Set QoS parameters for the downlink direction (see NOTE 2). |
| desiredUplinkPduSetQosParameters | PDUSet‌Qos‌Para | 0..1 | Desired PDU Set QoS parameters for the uplink direction (see NOTE 2). |
| downlink‌Expedited‌Transfer‌Indication | boolean | 0..1 | If set to true indicates this object applies to an application data flow whose transport is to be expedited by the network. In this case*,* downlink‌Bit‌Rates and uplink‌Bit‌Rates shall be set to the same values.  If set to false indicates this object applies to an application data flow whose transport is not to be expedited by the network.  Default value is false if omitted. |
| l4S‌Required | boolean | 0..1 | Requirement to enable ECN marking for L4S functionality for the media delivery session. |
| qoSMonitoring‌Required | boolean | 0..1 | Requirement to enable QoS monitoring functionality for the media delivery session. |
| NOTE 1: Clause 5.6.2.7 of TS 29.514 [18] restricts packet latency and packet loss to be the same in the downlink and uplink directions for a given MediaComponent when the CHEM feature is not supported by the PCF.  NOTE 2: Data type PDUSetQosPara is specified in clause 5.5.4.11 of TS 29.571 [33]. | | | |

Provisioning (M1) API

#### 8.3.3.1 ContentProtocols resource

Table 8.3.3.1-1: Definition of ContentProtocols resource

| Property name | Data Type | Cardinality | Description |
| --- | --- | --- | --- |
| downlinkIngestProtocols | array(Content‌Protocol‌Descriptor) | 0..1 | A set of ContentProtocolDescriptor objects, as specified in clause 8.3.3.2, each one uniquely identifying a content ingest protocol supported at reference point M2 and M10 by the Media AS associated with the parent Provisioning Session.  If present, the array shall contain at least one member. |
| uplinkEgestProtocols | array(Content‌Protocol‌Descriptor) | 0..1 | A set of ContentProtocolDescriptor objects, as specified in clause 8.3.3.2, each one uniquely identifying a content egest protocol supported at reference point M2 and M10 by the Media AS associated with the parent Provisioning Session.  If present, the array shall contain at least one member. |
| downlink‌Distribution‌Protocols | array(Content‌Protocol‌Descriptor | 0..1 | A set of ContentProtocolDescriptor objects, as specified in clause 8.3.3.2, each one uniquely identifying a distribution protocol supported at reference point M4 and M10 by the Media AS associated with the parent Provisioning Session.  If present, the array shall contain at least one member. |
| uplink‌Contribution‌Protocols | array(Content‌Protocol‌Descriptor | 0..1 | A set of ContentProtocolDescriptor objects, as specified in clause 8.3.3.2, each one uniquely identifying a contribution protocol supported at reference point M4 and M10 by the Media AS associated with the parent Provisioning Session.  If present, the array shall contain at least one member. |
| geoFencingLocatorTypes | array(Uri) | 0..1 | A set of fully-qualified term identifiers, each one indicating a content geo-fencing locator type supported at reference point M2 by the Media AS associated with the parent Provisioning Session. (See clause B.1.)  If present, the array shall contain at least one member. |

#### 8.3.3.2 ContentProtocolDescriptor type

Table 8.2.3.2-1: Definition of ContentProtocolDescriptor type

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data Type | Cardinality | Description |
| termIdentifier | Uri | 1..1 | A fully-qualified term identifier indicating support for a content protocol (see NOTE). |
| descriptionLocator | AbsoluteUrl | 0..1 | The location of a description of the content protocol, for example the public web URL of its specification. |
| NOTE: The controlled vocabulary of terms identifying 5G Media Streaming content ingest and content egest protocols at reference point M2 and M10 is specified in clause 8 of TS 26.512 [6]. The controlled vocabulary of terms identifying 5G Media Streaming content distribution and content contribution protocols at reference point M4 is specified in clause 10 of TS 26.512 [6]. | | | |

### 8.5.1 Overview

Content Preparation Templates are used to specify manipulations applied by a Media AS to downlink media resources ingested at reference point M2 or M10 for distribution via reference point M4 service locations, or to uplink media resources contributed at reference point M4 for egest at reference point M2 or M10. The Content Preparation Templates Provisioning API is used to provision a Content Preparation Template within the scope of a Provisioning Session that can subsequently be referenced from a Content Hosting Configuration or Content Publishing Configuration.

#### 8.7.3.1 PolicyTemplate resource

Table 8.7.3.1-1: Definition of PolicyTemplate resource

| Property | | Type | Cardinality | Usage | Description |
| --- | --- | --- | --- | --- | --- |
| policyTemplateId | | ResourceId | 1..1 | C: RO R: RO U: RO | Resource identifier of this Policy Template assigned by the Media AF that is unique within the scope of the Provisioning Session. |
| state | | string enum | 1..1 | C: RO R: RO U: RO | Current state of this Policy Template (see clause 5.2.7.2) exposed to the 5GMS Application Provider by the Media AF.  Only a Policy Template in the READY state may be instantiated as a Dynamic Policy Instance and applied to media streaming sessions. |
| stateReason | | Problem‌Details | 1..1 | C: RO R: RO U: RO | Additional details about the current state of this Policy Template exposed to the Media Application Provider by the Media AF.  The instance sub-property shall be present and shall indicate the URL of this Policy Template resource at reference point M1.  The title sub-property shall be present and shall indicate a human-readable representation of the *state* property specified above, e.g., "Policy Template ready for use" or "Policy Template invalid".  The detail sub-property shall be present and shall indicate a human-readable status/error message.  All other properties shall be omitted. |
| externalReference | | string | 1..1 | C: RW R: RW U: RW | Additional identifier for this Policy Template, unique within the scope of its Provisioning Session, that may be cross-referenced with external metadata about a media delivery session.  Example: "HD\_Premium". |
| application‌Session‌Contexts | | array(object) | 0..1 | C: RW R: RW U: RW | A set of application session contexts at reference point M4 to which this Policy Template may be applied.  Each object in the array shall specify at least one property. If more than one property is specified, instantiation of the Policy Template is restricted to the conjunction of all the object's properties. |
|  | sliceInfo | Snssai | 0..1 | C: RW R: RW U: RW | A Network Slice on which this Policy Template may be instantiated. (See clause 5.4.4.2 of TS 29.571 [33].) |
|  | dnn | Dnn | 0..1 | C: RW R: RW U: RW | A Data Network on which this Policy Template may be instantiated. (See clause 7.3.2.) |
| qoSSpecifications | | array(Qos‌Range) | 0..1 | C: RW R: RW U: RW | The network Quality of Service policy limits to be applied to the application service component(s) of media delivery sessions that instantiate this Policy Template (see NOTE and clause 7.3.3.4).  Each member of the array is identified by a component reference that is unique in this array.  If present, the array shall contain at least one object. |
| charging‌Specification | | Charging‌Specification | 0..1 | C: RW R: RW U: RW | The charging policy to be applied to media delivery sessions that instantiate this Policy Template is instantiated (see NOTE and clause 7.3.3.7). |
| bdtPolicyId | | BdtReferenceId | 0..1 | C: RW R: RO U: RW | A reference to an existing Background Data Transfer policy in the PCF (see NOTE 1).  Mutually exclusive with bdtSpecification. |
| bdtSpecification | | Bdt‌Policy‌Schedule | 0..1 | C: RW R: RO U: RW | The Background Data Transfer policy specification to be associated with media delivery sessions that instantiate this Policy Template (see clause 8.7.3.2).  Mutually exclusive with bdtPolicyId property. |
| l4SEnablement  Preference | | boolean | 0..1 | C: RW R: RO U: RW | If true, indicates a preference that ECN marking for L4S functionality is enabled in the Media Delivery System for media delivery sessions that instantiate this Policy Template.  Default value false if omitted. |
| qoSMonitoring‌Configuration | | Qos‌Monitoring‌Information | 0..1 | C: RW R: RO U: RW | If present, indicates a preference that QoS monitoring functionality is enabled in the Media Delivery System for media delivery sessions that instantiate this Policy Template. When this feature is enabled, QoS monitoring configuration is provided to the PCF/NEF (NOTE 2). |
| NOTE 1: Data type BdtReferenceId is specified in TS 29.122 [20].  NOTE 2: Data type QosMonitoringInformation is specified in TS 29.122 [20]. | | | | | |

At least one of the following properties shall be present: qosSpecification, chargingSpecification, bdtPolicyId, bdtSpecification.

#### 8.8.3.1 ContentHostingConfiguration resource

Table 8.8.3.1-1: Definition of ContentHostingConfiguration resource

| Property name | | | | Data Type | Cardinality | Description |
| --- | --- | --- | --- | --- | --- | --- |
| name | | | | string | 1..1 | A name for this Content Hosting Configuration. |
| ingestConfiguration | | | | Ingest‌Configuration | 1..1 | Parameters for ingesting media content into the Media AS at reference point M2 or M10. |
|  | mode | | | Content‌Transfer‌Mode | 1..1 | Indicates whether media content is pulled by the Media AS from the Media Application Provider's origin server at reference point M2 or from another Media AS at reference point M10, or else pushed into the Media AS by the Media Application Provider at reference point M2 or from another Media AS at reference point M10 (see clause 7.3.4.5). |
|  | protocol | | | Uri | 1..1 | A fully-qualified term identifier URL that identifies the content ingest protocol.  The controlled vocabulary of content ingest protocols is specified in clause 8 of TS 26.512 [6]. |
|  | baseURL | | | AbsoluteUrl | 0..1 | A base URL (i.e., one that includes a scheme, authority and, optionally, path segments) from which content is ingested by the Media AS at reference point M2 or M10 for this ingest configuration.  - In the case of pull-based content ingest (mode is set to PULL), the base URL shall be provided to the Media AF by the Media Application Provider to indicate the location from which content is to be pulled. A request to a reference point M4 service location is mapped by the Media AS to a URL at reference point M2 or M10 whose base is the value of this property.  - In the case of push-based content ingest (mode is set to PUSH), this property shall be populated by the Media AF and returned to the Media Application Provider to indicate the base URL to which content for this Content Hosting Configuration is to be published. |
| distributionConfigurations | | | | array(Distribution‌Configuration) | 1..1 | Specifies the distribution method and configuration for the ingested content.  The array shall contain at least one member. Hence, more than one distribution may be configured for the same ingested content, e.g. to offer different distribution configurations such as DASH and HLS, or to expose multiple service locations at reference point M4 or M10. |
|  | distributionId | | | string | 1..1 | An identification label, unique within the scope of this Content Hosting Configuration, that can be referenced by other resources in the Provisioning Session.  The value is nominated by the Media Application Provider. |
|  | mode | | | ContentTransferMode | 0..1 | Indicates whether media content is:  - pulled from the Media AS by a Media Access Client at reference point M4 or from another Media AS at reference point M10; or  - pushed by the Media AS into a downstream Media AS at reference point M10.  Default value if omitted: PULL. |
|  | affinityGroup | | | string | 0..1 | The Media Application Provider may assign an affinity group label indicating that the physical endpoint(s) of the reference point M4 service location exposed by this distribution configuration are to be deployed alongside those of service locations exposed by other distribution configurations declared in this Content Hosting Configuration with the same affinity group label. The physical endpoint(s) of service locations exposed by distribution configurations with different affinity group labels are intended to be deployed at mutually resilient network locations.  If this property is omitted, deployment of physical endpoint(s) for the service location of this distribution configuration is at the discretion of the Media AF. |
|  | supplementary‌Distribution‌Networks | | | array(<Distribution‌NetworkType, DistributionMode> | 0..1 | Indicates that the content for this distribution configuration is also to be distributed via one or more supplementary networks. Each member of the array is a duple mapping a type of distribution network to a mode of distribution.  The same DistributionNetworkType value shall appear at most once in this array. |
|  | edgeResources‌ConfigurationId | | | ResourceId | 0..1 | A reference to an Edge Resources Configuration resource (see clause 8.6.2).  When present, indicates that the Media AS supporting this content distribution shall be realised as a set of one or more EAS instances configured per the referenced resource. |
|  | content‌Preparation‌TemplateId | | | ResourceId | 0..1 | A reference to a Content Preparation Template resource (see clause 8.5.2).  Indicates that the referenced content preparation is required prior to distribution. |
|  | certificateId | | | ResourceId | 0..1 | A reference to a Server Certificate resource (see clause 8.4.3.2).  When content is distributed using TLS [29], the referenced X.509 [10] certificate for the origin domain is presented by the Media AS in the TLS handshake at reference point M4 or M10. This attribute indicates the identifier of the certificate to use.  - In the case of pull-based content distribution (content distribution mode is set to PULL), the referenced certificate shall be presented as a server certificate to the Media Client at reference point M4 or to the downstream Media AS at reference point M10.  - In the case of push-based content distribution to a downstream Media AS (content distribution mode is set to PUSH), the referenced certificate shall be presented as a client certificate to the downstream Media AS at reference point M10. |
|  | canonical‌Domain‌Name | | | string | 0..1 | All resources exposed from the service location at reference point M4 or M10 shall be accessible through this default Fully-Qualified Domain Name.  - In the case of pull-based content distribution at reference point M4 or M10 (content distribution mode is set to PULL), the value shall be assigned by the Media AF.  - In the case of push-based content distribution to a downstream Media AS at reference point M10 (content distribution mode is set to PUSH), this property shall not be populated because the Media AS acts as the pushing client in this case. |
|  | domainNameAlias | | | string | 0..1 | The Media Application Provider may assign another Fully-Qualified Domain Name (FQDN) through which media resources within the scope of this distribution configuration are additionally accessible from the Media AS from the reference point M4 service location.  This domain name is used by the Media AS to set appropriate CORS HTTP response headers sent from the reference point M4 service location.  If this property is present, the Media Application Provider is responsible for providing in the DNS a CNAME record that resolves domainNameAlias to canonical‌Domain‌Name.  If the certificateId property is also present in this distribution configuration, the provided domain name alias shall match one of the subjectAltName extension fields in the referenced Server Certificate resource, allowing for wildcard matching.  This property shall be omitted if content distribution *mode* is set to *PUSH* because the Media AS acts as the pushing client in this case. |
|  | baseURL | | | AbsoluteUrl | 1..1 | A service location base URL (i.e., one that includes a scheme, authority and, optionally, path segments) from which content is made available to Media Clients at reference point M4 or to another Media AS at reference point M10 for this distribution configuration.  - In the case of pull-based content distribution at reference point M4 or M10 (content distribution mode is set to PULL), the value is chosen by the Media AF when the Content Hosting Configuration is provisioned. It is an error for the Media Application Provider to set this.  - In the case of push-based content distribution to a downstream Media AS at reference point M10 (content distribution mode is set to PUSH), this property shall be populated by the Media Application Provider with a base URL previously nominated by the Media AF managing that downstream Media AS. |
|  | entryPoint | | | Relative‌Media‌Entry‌Point | 0..1 | The Media Entry Point nominated by the Media Application Provider for this distribution configuration when it is used to describe a single content item and/or streaming session configuration (see clauses 5.2.8.2 and 7.3.3.12).  This property may be omitted when this distribution configuration describes multiple content items or streaming session configurations.  This property shall be omitted if content distribution *mode* is set to *PUSH*. |
|  |  | relativePath | | RelativeUrl | 1..1 | A relative path (i.e., without a scheme or any leading forward slash characters) to the Media Entry Point document resource. The semantics are dependent on the value of ingestConfiguration.protocol.  The path shall be valid at reference point M2 or M10 when appended to the ingest base URL and at reference point M4 when appended to the service location distribution base URL. |
|  |  | contentType | | string | 1..1 | The MIME content type of the Media Entry Point.  Used by the Media Client to select a Media Entry Point. |
|  |  | protocol | | Uri | 0..0 | This property shall not be present in a distribution configuration. |
|  |  | profiles | | array(Uri) | 0..1 | An optional list of conformance profile identifiers associated with the Media Entry Point, each one expressed as a URI. A profile URI may indicate an interoperability point, for example.  Used by the Media Client to select a Media Entry Point.  If present, the array shall contain at least one item. |
|  | pathRewriteRules | | | array(Path‌Rewrite‌Rule) | 0..1 | An ordered list of rules for rewriting the request URL paths of media resource requests handled by the Media AS at reference point M4 service location and translating them to URL paths at reference point M2 or M10.  If multiple rules match a particular resource’s path, only the first matching rule, in order of appearance in this array, shall be applied. |
|  |  | requestPathPattern | | string | 1..1 | A regular expression [36] against which the path part of each Media AS request URL, including the leading “/”, and up to and including the final “/”, shall be compared. (Any leaf path element following the final “/” shall be excluded from this comparison.)  In the case of pull-based content ingest, the M4 download request path is used in the comparison.  In the case of push-based content ingest, the M2 or M10 upload request path is used in the comparison.  In either case, if the request path matches this pattern, the path mapping specified in the corresponding mappedPath shall be applied. |
|  |  | mappedPath | | string | 1..1 | A replacement for the portion of the Media AS request path that matches requestPathPattern.  In the case of pull-based content ingest, ingestConfiguration.entryPoint is concatenated with the mapped path and any leaf path element from the original M4 download request to form the M2 or M10 origin request URL.  In the case of push-based content ingest, canonical‌Domain‌Name (and, optionally, domain‌Name‌Alias) are concatenated with the mapped path and any leaf path element from the original M2 or M10 upload request to form the service location distribution URL(s) exposed at reference point M4 or M10. |
|  | cachingConfigurations | | | array(Caching‌Configuration) | 0..1 | A set of configurations of the Media AS content cache nominated by the Media Application Provider, each one affecting a matching subset of media resources ingested in relation to this Content Hosting Configuration. (See clause 7.3.3.13.)  If present, the array shall have at least one member. |
|  |  | urlPatternFilter | | string | 1..1 | A pattern used to match media resource URLs at reference point M2 or M10 to determine whether a given media resource ingested by the Media AS is eligible to be cached by it. The format of the pattern shall be a regular expression as specified in [36]. |
|  |  | cachingDirectives | | object | 1..1 | If a urlPatternFilter applies to a resource, then the provided cachingDirectives shall be applied by the Media AS to resources served through the reference point M4 or M10 service location, potentially overwriting any origin caching directives provided by the Media Application Provider when that resource is ingested at reference point M2 or M10. |
|  |  |  | statusCodeFilters | array(integer) | 0..1 | The set of HTTP origin response status codes at reference point M2 or M10 to which these cachingDirectives apply.  If the property is present, the array shall contain at least one item.  If absent, the enclosing cachingDirectives shall apply to all HTTP origin response status codes. |
|  |  |  | noCache | boolean | 0..1 | If set to true, indicates that the media resources matching the filters shall be marked by the Media AS as not to be cached when it serves such media resources from a reference point M4 service location.  Default value if omitted: false. |
|  |  |  | maxAge | Uint32 | 0..1 | The caching time-to-live period, expressed in seconds, of ingested media resources matching the filters. This determines the minimum period for which the Media AS shall cache matching media resources. If noCache is false, it also determines the time-to-live period signalled by the Media AS at reference point M4 service locations when it serves such media resources.  The time-to-live for a given media resource shall be calculated relative to the time it was ingested by the Media AS.  If noCache is false or omitted, ingested media resources shall be cached until the caching time-to-live period has been exceeded (if maxAge is present), indefinitely until the Content Hosting Configuration is destroyed by the Media Application Provider (if maxAge is omitted), until the Media Application Provider purges the cache, or until the available caching resources in the Media AS are exhausted, whichever is sooner. |
|  | geoFencing | | | object | 0..1 | Directives limiting access to the content to the indicated geographic areas (see NOTE 1). |
|  |  | locatorType | | Uri | 1..1 | The type of the members of the locators array shall be indicated using a fully-qualified term identifier URI from the controlled vocabulary specified in clause B.1, or else from a vendor-specific vocabulary. |
|  |  | locators | | array(string) | 1..1 | Array of locators from which access to the resources is to be allowed. The format of the locator strings shall be determined by the semantics of the term identifier indicated in locatorType. |
|  | urlSignature | | | object | 0..1 | Defines the URL signing scheme to be enforced by the Media AS at the reference point M4 service location (see NOTE 2). When present, only correctly signed and valid URLs are permitted to access the content resources within the scope of the enclosing distribution configuration. |
|  |  | urlPattern | | string | 1..1 | A pattern that shall be used by the Media AS to match M4 media resource request URLs. The Media AS shall not serve a matching media resource from the reference point M4 service location unless it includes a valid authentication token calculated over the portion of the M4 request URL that matches this pattern. The format of the pattern shall be a regular expression as specified in [36]. |
|  |  | tokenName | | string | 1..1 | The name of the query parameter that the Media Access Function shall use to present the authentication token in the M4 request URL when required to do so. |
|  |  | passphraseName | | string | 1..1 | The name of the token parameter to be used to refer to the passphrase when constructing the M4 authentication token. |
|  |  | passphrase | | string | 1..1 | A string of between 6 and 50 characters to be used as the shared secret between the Media Application Provider and the Media AS for this DistributionConfiguration.  (This secret is used in the computation and verification of the M4 authentication token but is never sent in the cleartext part of the M4 request URL.) |
|  |  | tokenExpiryName | | string | 1..1 | The name of the token parameter to be used to refer to the token expiry time point when constructing the M4 authentication token.  The name of the query parameter that the Media Access Function shall use to present the token expiry time point in the cleartext part of the M4 request URL. |
|  |  | useIPAddress | | boolean | 1..1 | If set to true, the IP address of the Media Access Function is included in the computation of the authentication token for resources that match urlPattern and access to matching media resources shall be allowed by the Media AF only when the M4 request is made from this IP address. |
|  |  | ipAddressName | | string | 0..1 | The name of the token parameter that is encoded as part of the M4 authentication token if the useIPAddress flag is set to true.  (The IP address is not passed in the cleartext part of the M4 request URL.) |
| NOTE 1: The geofencing feature used to restrict content requests to the Media AS at reference point M4 is specified in clause 7.6.4.6 of TS 26.512 [6].  NOTE 2: The format of the authentication token used to sign content requests to the Media AS at reference point M4 service locations is specified in clause 7.6.4.5 of TS 26.512 [6]. | | | | | | |

#### 8.9.3.1 ContentPublishingConfiguration resource

Table 8.9.3.1-1: Definition of ContentPublishingConfiguration resource

| Property name | | | | Data type | Cardinality | Description |
| --- | --- | --- | --- | --- | --- | --- |
| name | | | | string | 1..1 | A name for this Content Publishing Configuration. |
| contribution‌Configurations | | | | array(Contribution‌Configuration) | 1..1 | Specifies the Media Entry Point and content preparation required for the egested content.  The array shall contain at least one member. Hence, more than one contribution may be configured for different content types. |
|  | contributionId | | | string | 1..1 | An identification label, unique within the scope of this Content Publishing Configuration, that can be referenced by other resources in the Provisioning Session.  The value is nominated by the Media Application Provider. |
|  | mode | | | ContentTransferMode | 0..1 | Indicates whether media content is:  - Pushed to the Media AS by a Media Access Client to the Media AS at reference point M4 or from another Media AS at reference point M10; or  - Pulled from a downstream Media AS at reference point M10.  Default value if omitted: PUSH. |
|  | affinityGroup | | | string | 0..1 | The Media Application Provider may assign an affinity group label indicating that the physical endpoint(s) of the reference point M4 service location exposed by this contribution configuration are to be deployed alongside those of service locations exposed by other contribution configurations declared in this Content Publishing Configuration with the same affinity group label. The physical endpoint(s) of service locations exposed by contribution configurations in this Content Publishing Configuration with different affinity group labels are intended to be deployed at mutually resilient network locations.  If this property is omitted, deployment of physical endpoint(s) for the service location of this contribution configuration is at the discretion of the Media AF. |
|  | edgeResources‌ConfigurationId | | | ResourceId | 0..1 | A reference to an Edge Resources Configuration resource (see clause 8.6.2).  When present, indicates that the Media AS supporting this content contribution shall be realised as a set of one or more EAS instances configured per the referenced resource. |
|  | content‌Preparation‌TemplateId | | | ResourceId | 0..1 | A reference to a Content Preparation Template resource (see clause 8.5.2).  Indicates that the referenced content preparation is required prior to egest. |
|  | certificateId | | | ResourceId | 0..1 | A reference to a Server Certificate resource (see clause 8.4.3.2).  When content is contributed using TLS [29], the referenced X.509 [10] certificate for the origin domain is presented by the Media AS in the TLS handshake at reference point M4. This attribute indicates the identifier of the certificate to use.  - In the case of push-based content contribution (content contribution mode is set to PUSH), the referenced certificate shall be presented as a server certificate to the contributing Media Client at reference point M4 or to the downstream contributing Media AS at reference point M10.  - In the case of pull-based content contribution (content contribution mode is set to PULL), the referenced certificate shall be presented as a client certificate to the downstream contributing Media AS at reference point M10. |
|  | canonical‌Domain‌Name | | | string | 0..1 | All resources exposed from the service location at reference points M4 and M10 shall be accessible through this default Fully-Qualified Domain Name.  - In the case of push-based content contribution at reference point M4 or M10 (content contribution mode is set to PUSH), this property shall be assigned by the Media AF.  - In the case of pull-based content contribution from a downstream contributing Media AS at reference point M10 (content contribution mode is set to PULL), this property shall be omitted because the Media AS acts as the pulling client in this case. |
|  | domainNameAlias | | | string | 0..1 | The Media Application Provider may assign another Fully-Qualified Domain Name (FQDN) through which media resources within the scope of this contribution configuration are additionally accessible from the Media AS from the reference point M4 service location.  This domain name is used by the Media AS to set appropriate CORS HTTP response headers at the reference point M4 service location.  If this property is present, the Media Application Provider is responsible for providing in the DNS a *CNAME* record that resolves domainNameAlias to canonicalDomainName.  If the certificateId property is also present in this contribution configuration, the provided domain name alias shall match one of the subjectAltName extension fields in the referenced Server Certificate resource, allowing for wildcard matching.  This property shall be omitted if content distribution mode is set to PULL because the Media AS acts as the pulling client in this case. |
|  | baseURL | | | AbsoluteUrl | 1..1 | A service location base URL (i.e. one that includes a scheme, authority, and, optionally, path segments) to which content is contributed by Media Clients at reference point M4 or by another Media AS at reference point M10 for this contribution configuration.  - In the case of push-based content contribution at reference point M4 or M10 (content contribution mode is set to PUSH), the value is nominated by the Media AF when the Content Publishing Configuration is provisioned. It is an error for the Media Application Provider to set this.  - In the case of pull-based content contribution from a downstream contributing Media AS at reference point M10 (content contribution mode is set to PULL), this property shall be populated by the Media Application Provider with a content egest base URL previously nominated by the Media AF managing that downstream Media AS. |
|  | entryPoint | | | Relative‌Media‌Entry‌Point | 0..1 | The Media Entry Point for this contribution configuration (see clauses 5.2.9.2 and 7.3.3.12). The value is nominated by either the Media AF or the Media Application Provider.  In the case where service chaining is in use via reference point M10, the value may have been nominated by another Media AF. |
|  |  | relativePath | | Relative‌Url | 1..1 | A relative path (i.e., without a scheme or any leading forward slash characters) for this Media Entry Point which may point to a document resource.  Nominated by the Media AF. |
|  |  | contentType | | string | 1..1 | The MIME content type of this Media Entry Point.  This property shall be mutually exclusive with protocol.  Used by the Media Client to select a contribution configuration.  Nominated by the Media Application Provider. |
|  |  | protocol | | Uri | 1..1 | A fully-qualified term identifier URI that identifies the media contribution protocol used at the reference point M4 service location for this Media Entry Point.  This property shall be mutually exclusive with contentType.  Nominated by the Media Application Provider.  The controlled vocabulary of media contribution protocols is specified in clause 10 of TS 26.512 [6]. |
|  |  | profiles | | array(Uri) | 0..1 | An optional list of conformance profile identifiers associated with this Media Entry Point, each one expressed as a URI. A profile URI may indicate an interoperability point, for example.  Used by the Media Client to select a contribution configuration.  Nominated by the Media Application Provider and, if present, the array shall contain at least one item. |
| egestConfiguration | | | | Egest‌Configuration | 1..1 | Parameters for egesting media content from the Media AS at reference point M2 or M10. |
|  | mode | | | Content‌Transfer‌Mode | 1..1 | Indicates whether content is pulled from the Media AS by the Media Application Provider at reference point M2 or from another Media AS at reference point M10, or else pushed to the Media Application Provider by the Media AS at reference point M2 or to another Media AS at reference point M10 (see clauses 5.2.8.2 and 7.3.4.5).  Nominated by the Media Application Provider. |
|  | protocol | | | Uri | 1..1 | A fully-qualified term identifier URI that identifies the content egest protocol.  Nominated by the Media Application Provider.  The controlled vocabulary of content egest protocols is specified in clause 8 of TS 26.512 [6]. |
|  | baseURL | | | Absolute‌URL | 0..1 | A base URL (i.e., one that includes a scheme, authority, and, optionally, path segments) to which content is published at reference point M2 or M10 for this publishing configuration.  - In the case of pull-based content egest (modeis set to PULL), this property shall be populated by the Media AF to indicate the location on the Media AS from which content is to be pulled. An uplink media streaming request received at reference point M4 service location is mapped by the Media AS to a URL at reference point M2 or M10 whose base is the value of this property.  - In the case of push-based content egest (modeis set to PUSH), this property shall be provided to the Media AF by the Media Application Provider and indicates the base URL to which content for this Content Publishing Configuration is to be published. |
|  | entryPoint | | | Relative‌Media‌Entry‌Point | 0..1 | The Media Entry Point for content egest used by the Media Application Provider at reference point M2 or M10.  In the case of pull-based content egest (modeis set to PULL), this object shall be provided by the Media AF.  In the case of push-based content egest (modeis set to PUSH), this object may be provided by the Media Application Provider or an upstream Media AF in the case service chaining is in use via reference point M10.  The semantics of the entry point are dependent on the value of the contentType property. |
|  |  | relativePath | | Relative‌URL | 1..1 | A relative path (i.e., without a scheme or any leading forward slash characters) to the Media Entry Point document resource.  Nominated by the Media AF for pull-based content egest.  Nominated by the Media Application Provider for Push-based content egest. |
|  |  | contentType | | string | 1..1 | The MIME content type of this Media Entry Point.  Nominated by the Media Application Provider. |
|  |  | protocol | | Uri | 1..1 | A fully-qualified term identifier URI that identifies the media egest protocol at reference point M2 for this Media Entry Point.  This property shall be mutually exclusive with contentType.  Nominated by the Media Application Provider.  The controlled vocabulary of media contribution protocols is specified in clause 10 of TS 26.512 [6]. |
|  |  | profiles | | array(Uri) | 0..1 | An optional list of conformance profile identifiers associated with this Media Entry Point, each one expressed as a URI. A profile URI may indicate an interoperability point, for example.  Nominated by the Media Application Provider and, if present, the array shall contain at least one item. |
|  | cachingConfigurations | | | array(Caching‌Configuration) | 0..1 | A set of configurations of the Media AS cache nominated by the Media Application Provider, each one affecting a matching subset of media resources intended for pull-based egest at reference point M2 or M10 in relation to this Content Publishing Configuration. (See clause 7.3.3.13.)  Applicable only for pull-based content egest (modeis set to PULL). For Push-based egest (methodis set to PUSH), this property shall not be present.  If present, the array shall have at least one member. |
|  |  | urlPatternFilter | | string | 1..1 | A pattern used to match media resource URLs to determine whether a given media resource is eligible for caching by the Media AS. The format of the pattern shall be a regular expression as specified in [36]. |
|  |  | cachingDirectives | | object | 1..1 | If a urlPatternFilter applies to a resource, then the provided cachingDirectives shall be applied by the Media AS at reference point M2 or M10. Any caching directives set by the Media Streamer on content contributed at a reference point M4 service location which define a shorter lifetime for the content shall take precedence over these parameters. |
|  |  |  | statusCodeFilters | array(integer) | 0..1 | The set of Media AS response status codes at reference point M2 or M10 to which these cachingDirectives apply.  If the property is present, the array shall contain at least one item.  If absent, the enclosing cachingDirectives shall apply to all Media AS responses. |
|  |  |  | noCache | boolean | 0..1 | If set to *true*, this indicates that the media resources matching the filters shall be marked by the Media AS as not to be cached when it serves such media resources at reference point M2 or M10.  Default value if omitted: false. |
|  |  |  | maxAge | Uint32 | 0..1 | The caching time-to-live period, expressed in seconds, of media resources matching the filters. This determines the minimum period for which the Media AS shall cache matching media resources. If noCache is false, it also determines the time-to-live period signalled by the Media AS at reference point M2 or M10 when it serves such media resources.  The time-to-live for a given media resource shall be calculated relative to the time it was contributed to the Media AS.  If noCache is false or omitted, ingested media resources shall be cached until the caching time-to-live period has been exceeded (if maxAge is present), indefinitely until the Content Publishing Configuration is destroyed by the Media Application Provider (if maxAge is omitted), until the Media Application Provider purges the cache, or until the available caching resources in the Media AS are exhausted, whichever is sooner. |

Service Access Information (M5/M3) API

#### 9.2.3.1 ServiceAccessInformation resource type

The data model for the ServiceAccessInformation resource is specified in table 9.2.3.1-1 below. Different properties are present in the resource depending on the type of Provisioning Session from which the Service Access Information is derived (as indicated in the provisioningSessionType property) and this is specified in the *Applicability* column.

Table 9.2.3.1‑1: Definition of ServiceAccessInformation resource

| Property name | | | Type | Cardinality | Description | Applicability |
| --- | --- | --- | --- | --- | --- | --- |
| provisioningSessionId | | | ResourceId | 1..1 | Unique identification of the M1 Provisioning Session. | All types |
| provisioningSession‌Type | | | Provisioning‌Session‌Type | 1..1 | The type of Provisioning Session. | All types. |
| locationReporting | | | boolean | 1..1 | If true, the Media Session Handler or Media AS is required to provide UE location data in Dynamic Policy interactions (see clause 9.3.3.1), Network Assistance interactions (see clause 9.4.3.1), QoE metrics reporting interactions (see clause 9.5.3) and consumption reporting interactions (see clause 9.6.3.2).  Shall be set *false* if the locationReporting parameter is omitted from the ProvisioningSession, as specified in table 8.2.3.1‑1. | All types. |
| notificationURL | | | AbsoluteURL | 0..1 | A URL to the MQTT channel, nominated by the Media AF, over which notifications are to be sent by the Media AF (see clause 10.2). | All types. |
| streamingAccess | | | object | 0..1 | Present if Content Hosting or Content Publishing is provisioned in the parent Provisioning Session. | MS\_DOWNLINK*,* MS\_UPLINK |
|  | entryPoints | | array(Absolute‌Media‌Entry‌Point) | 0..1 | A list of alternative Media Entry Points for the Media Client to choose between. |
|  |  | locator | AbsoluteUrl | 1..1 | Populated from information in the Content Hosting Configuration or Content Publishing Configuration as specified in clause 8 of TS 26.512 [6].  For downlink media streaming, one of the following:  - A pointer to a document available for download at reference point M4 that defines a media presentation (e.g. a DASH MPD) whose resources are mapped to reference point M2 or M10 by means of a content ingest configuration in a Content Hosting Configuration.  - A pointer to a document available for download at reference point M4 that provides additional details for a downlink streaming session configuration and/or references a media presentation (e.g. a DASH MPD) whose resources are mapped to reference point M2 or M10 by means of content ingest configuration in a Content Hosting Configuration.  - The URL of a single media resource (e.g. an MP4 asset) available for download at reference point M4 that is mapped to reference point M2 or M10 by means of a content ingest configuration in a Content Hosting Configuration.  In all the above cases, the contentType property shall also be present.  For uplink media streaming, one of the following:  - A pointer to a document available for download at reference point M4 that defines a media presentation (e.g. a DASH MPD) whose resources are mapped to an egest configuration at reference point M2 or M10 by means of a content egest configuration in a Content Publishing Configuration (in which case the contentType property shall also be present)  - A pointer to a document available for download at reference point M4 that provides additional details for an uplink streaming session configuration and/or references a media presentation (e.g. a DASH MPD) whose resources are mapped to reference point M2 or M10 by means of content egest configuration in a Content Publishing Configuration (in which case the contentType property shall also be present).  - The URL of a path at reference point M4 the sub-resources of which are mapped to reference point M2 or M10 by a Content Publishing Configuration (in which case the protocol property shall also be present). |
|  |  | contentType | string | 1..1 | The MIME content type of resource at locator.  This property shall be mutually exclusive with protocol. |  |
|  |  | protocol | Uri | 1..1 | A fully-qualified term identifier URI that identifies the media delivery protocol at reference point M4 for this Media Entry Point.  This property shall be mutually exclusive with contentType.  The controlled vocabulary of media delivery protocols at this reference point is specified in clause 10 of TS 26.512 [6]. |  |
|  |  | profiles | array(Uri) | 0..1 | An optional list of conformance profile URIs with which this Media Entry Point is compliant.  If present, the array shall contain at least one item. |  |
|  | eMBMS‌Service‌Announcement‌Locator | | AbsoluteUrl | 0..1 | A pointer to an eMBMS User Service Announcement document. |  |
|  | mbs‌External‌Service‌Identifier | | string | 0..1 | The external service identifier of an MBS User Service. |  |
| rtcClientConfiguration | | | object | 0..1 | Present if real-time media communication (RTC) is provisioned. | RTC |
|  | stunEndpoints | | array(Client‌Service‌Endpoint‌Access‌Parameters) | 0..1 | An array of one or more trusted STUN service endpoints for use as ICE candidates. If present, the RTC Client shall use one of the listed servers for RTC-based media delivery sessions within the scope of provisioning‌SessionId.  If the credentials sub-property was not provisioned at reference point M1, the Media AF shall populate this with a set of credentials unique to the requesting Media Client. |
|  | turnEndpoints | | array(Client‌Service‌Endpoint‌Access‌Parameters) | 0..1 | An array of one or more trusted TURN service endpoints for use as ICE candidates. If present, the RTC Client shall use one of the listed servers for RTC-based media delivery sessions within the scope of provisioning‌SessionId.  If the credentials sub-property was not provisioned at reference point M1, the Media AF shall populate this with a set of credentials unique to the requesting Media Client. |
|  | swapEndpoints | | array(Client‌Service‌Endpoint‌Access‌Parameters) | 0..1 | An array of one or more trusted WebRTC Signalling Function service endpoints that support the SWAP protocol. If present, the RTC Client shall use one of the listed servers for RTC-based media delivery sessions within the scope of provisioning‌SessionId.  If the credentials sub-property was not provisioned at reference point M1, the Media AF shall populate this with a set of credentials unique to the requesting Media Client. |
| clientConsumptionReporting‌Configuration | | | object | 0..1 | Present if consumption reporting is activated for this Provisioning Session. | MS\_DOWNLINK*,* RTC |
|  |  | reportingInterval | DurationSec | 0..1 | The time interval, expressed in seconds, between consumption report messages being sent by the consumption reporting entity. The value shall be greater than zero.  When this property is omitted, a single final report shall be sent immediately after the media streaming session has ended. |  |
|  |  | serverAddresses | array(AbsoluteUrl) | 1..1 | A list of Media AF addresses (URLs) where the consumption reporting messages are sent by the consumption reporting entity. (See NOTE 1).  Each address shall be an opaque base URL, following the format specified in clause 7.1.3 up to and including the {apiVersion} path element. |  |
|  |  | accessReporting | boolean | 1..1 | Indicates whether the consumption reporting entity is required to supply consumption reporting units whenever the access network changes during a media delivery session.  Shall be set *false* if the accessReporting parameter is omitted from the Consumption‌Reporting‌Configuration, as specified in table 8.12.3.1‑1. |  |
|  |  | samplePercentage | Percentage | 1..1 | The percentage of media delivery sessions required to report consumption, expressed as a floating-point value between 0.0 and 100.0.  Shall be set to 100.0 if the samplePercentage parameter is omitted from the Consumption‌Reporting‌Configuration, as specified in table 8.12.3.1‑1. |  |
| dynamicPolicyInvocation‌Configuration | | | object | 0..1 | Present if Policy Templates have been provisioned in the parent Provisioning Session and at least one of them is in the READY state. | MS\_DOWNLINK*,* MS\_UPLINK*,* RTC |
|  | serverAddresses | | array(AbsoluteUrl) | 1..1 | A list of Media AF addresses (URLs) which offer the APIs for dynamic policy invocation. (See NOTE 1.)  Each address shall be an opaque base URL, following the format specified in clause 7.1.3 up to and including the {apiVersion} path element. |  |
|  | policyTemplateBindings | | array(object) | 1..1 | A list of duples, each one binding an external reference to a Policy Template resource identifier. |  |
|  |  | externalReference | string | 1..1 | Additional identifier for this Policy Template, unique within the scope of its Provisioning Session, that can be cross-referenced with external metadata about the media streaming session.  Example: "HD\_Premium". |  |
|  |  | policyTemplateId | ResourceId | 1..1 | The resource identifier of a Policy Template tagged with externalReference that is in the READY state. |  |
|  |  | pduSetMarking | boolean | 0..1 | If *true*, indicates that PDU Set marking applies to Dynamic Policy Instances based on policyTemplateId.  Default value false if omitted. | RTC |
|  |  | downlink‌Data‌Burst‌Size‌Marking‌Required | boolean | 0..1 | If true, indicates that data burst size marking of downlink PDUs is required for Dynamic Policy Instances based on policyTemplateId*.*  Default value falseif omitted. |  |
|  |  | downlink‌Time‌To‌Next‌Burst‌Marking‌Required | boolean | 0..1 | If true, indicates that time to next burst marking of downlink PDUs is required for Dynamic Policy Instances based on policyTemplateId*.*  Default value falseif omitted. |  |
|  |  | downlink‌Expedited‌Transfer‌Indication‌Marking‌Required | boolean | 0..1 | If true*,* indicates that expedited transfer indication marking of downlink PDUs is required for Dynamic Policy Instances based on policyTemplateId.  Default value false if omitted. |  |
|  |  | bdtWindows | array(BdtWindow) | 0..1 | A list of Background Data Transfer time windows during which the application may request the activation of a Background Data Transfer policy by instantiating the Policy Template identified by policyTemplateId. The actual usage quotas for data volume and bit rate are determined by the Media AF upon instantiation of the Policy Template.  BdtWindow is specified in clause 7.3.3.14. | MS\_DOWNLINK, MS\_UPLINK |
|  |  | l4sEnablement‌Preference | boolean | 0..1 | Indicates a preference that ECN marking for L4S functionality is enabled by the Media Session Handler for media delivery sessions that instantiate this Policy Template.  Present only if ECN marking for L4S functionality is supported in the 5G System and by the Media AS. The Media AF may query the features supported by the 5G System (i.e. PCF, NEF) as described in clause 6.6.2 of TS 29.500 [30].  Default value false if omitted. | MS\_DOWNLINK, MS\_UPLINK, RTC |
|  |  | qoSMonitoring‌Enablement‌Preference | boolean | 0..1 | Indicates a preference that QoS monitoring functionality is enabled by the Media Session Handler for media delivery sessions that instantiate this Policy Template.  Present only if the QoS monitoring feature is supported in the 5G System. The Media AF may query the features supported by the 5G System (i.e. PCF, NEF) as described in clause 6.6.2 of TS 29.500 [30].  Default value false if omitted. |  |
|  | sdfMethods | | array(SdfMethod) | 1..1 | A list of Service Data Flow description methods, e.g. 5-tuple, TOS, 2-tuple, etc., to be used to describe the application flows at reference point M2 or M12 for media delivery sessions. |  |
| clientMetricsReporting‌Configurations | | | array(object) | 0..1 | Present if QoE metrics reporting is provisioned in the parent Provisioning Session.  If present, contains one or more client metrics reporting configurations. | MS\_DOWNLINK*,* MS\_UPLINK*,* RTC |
|  | metricsReporting‌ConfigurationId | | ResourceId | 1..1 | The identifier of this metrics reporting configuration, unique within the scope of the parent Provisioning Session.  The value shall be the same as the corresponding identifier provisioned at reference point M1 (see clause 8.11.3.1). |
|  | serverAddresses | | array(AbsoluteUrl) | 1..1 | A list of Media AF addresses to which metrics reports shall be sent. (See NOTE 1).  Each address shall be an opaque base URL, following the format specified in clause 7.1.3 up to and including the {apiVersion} path element. |
|  | sliceScope | | array(Snssai) | 0..1 | The set of network slice(s) for which metrics collection and reporting shall be executed in connection with this metrics reporting configuration (see NOTE 3).  If present, the array shall identify at least one network slice.  If absent, metrics shall be collected and reported for media delivery sessions within the scope of the parent Provisioning Session regardless of network slice. |
|  | scheme | | Uri | 1..1 | A URI identifying the metrics scheme that metrics reports shall use (see clause 5.2.11).  The set of QoE metrics schemes valid for use in 5G Media Streaming along with their respective scheme identifiers is specified in clauses 4.7.5 and 7.8.1 of TS 26.512 [6].  The QoE metrics scheme valid for use in RTC along with its respective scheme identifier is specified in clause 15 of TS 26.113 [7]. |
|  | dataNetworkName | | Dnn | 0..1 | The name of the Data Network which shall be used to send metrics reports.  If not specified, the default Data Network shall be used. |
|  | reportingStartOffset | | DurationSec | 0..1 | The time offset (expressed in seconds) from the start of a media delivery session when the metrics reporting entity is required to begin submitting metrics reports.  If omitted, the value of this parameter is assumed to be zero, i.e., directing the Media Client to start reporting metrics from the start of the media delivery session. |
|  | reportingDuration | | DurationSec | 0..1 | The period of time (expressed in seconds) measured relative to the reporting start point, after which the metrics reporting entity is required to stop reporting metrics.  If omitted, reporting is required to continue until the end of the media delivery session. |
|  | reportingInterval | | DurationSec | 0..1 | The time interval, expressed in seconds, between metrics reports being sent by the metrics reporting entity. The value shall be greater than zero.  When this property is omitted, a single final report shall be sent immediately after the media streaming session has ended. |
|  | samplePercentage | | Percentage | 1..1 | The percentage of media delivery sessions required to report QoE metrics, expressed as a floating-point value between 0.0 and 100.0. |
|  | positive‌Crossing‌Thresholds | | map(Uri -> array(Float)) | 0..1 | If present, a non-empty map of QoE metrics to their respective threshold values.  - The index of the associative array shall be the fully-qualified term identifier URI of a metric specified in annex E of TS 26.512 [6] or annex C of TS 26.113 [7].  - The value of each associative array member shall be an array of floating-point threshold values.  A metric in this associative array shall be reported once when its value exceeds one of the associated threshold values, and shall not be reported again until it falls below that threshold and subsequently exceeds it. |
|  | negative‌Crossing‌Thresholds | | map(Uri -> array(Float)) | 0..1 | If present, a non-empty map of QoE metrics to their respective threshold values.  - The index of the associative array shall be the fully-qualified term identifier URI of a metric specified in annex E of TS 26.512 [6] or annex C of TS 26.113 [7].  - The value of each associative array member shall be an array of floating-point threshold values.  A metric in this associative array shall be reported once when its value falls below one of the associated threshold values, and shall not be reported again until it exceeds that threshold and subsequently falls below it. |
|  | location‌Filter | | array(LocationArea5G) | 0..1 | A list of one or more locations (see NOTE 3) where QoE metrics collection is required. When present, a Media Client shall collect metrics only when it is located in these locations and shall report them according to the other properties of the enclosing client metrics reporting configuration.  If omitted, QoE metrics are to be collected and reported regardless of the UE location. |
|  | urlFilters | | array(string) | 0..1 | A non-empty list of Media Entry Point URL patterns for which QoE metrics shall be reported. The format of each pattern shall be a regular expression as specified in [36].  If not specified, reporting shall be done for all media delivery sessions. |
|  | samplingPeriod | | DurationSec | 1..1 | The time interval the Media Client is required to wait between sampling the QoE metrics specified by this metrics reporting configuration. |
|  | metrics | | array(Uri) | 0..1 | A list of one or more QoE metrics, each indicated by a fully-qualified term from a controlled vocabulary, which are to be reported.  If omitted, the complete (or default if applicable) set of metrics associated with the specified scheme shall be collected and reported. |
| networkAssistance‌Configuration | | | object | 0..1 | Present if Network Assistance is provisioned in the parent Provisioning Session. | MS\_DOWNLINK*,* MS\_UPLINK*,* RTC |
|  | serverAddresses | | array(AbsoluteUrl) | 1..1 | A list of Media AF addresses (URLs) that offer the APIs for AF-based Network Assistance at reference point M5. (See NOTE 1.)  Each address shall be an opaque URL, following the format specified in clause 7.1.3 up to and including the {apiVersion} path element. |
| client‌EdgeResources‌Configuration | | | object | 0..1 | Present only for Provisioning Sessions with client-driven edge computing management mode provisioned. | MS\_DOWNLINK*,* MS\_UPLINK*,* RTC |
|  | eligibilityCriteria | | Edge‌Processing‌Eligibility‌Criteria | 0..1 | Conditions for activating edge resources for media delivery sessions in the scope of the parent Provisioning Session. (See clause 7.3.3.10.) |
|  | easDiscoveryTemplate | | EAS‌Discovery‌Template | 1..1 | A template for the EAS discovery filter that shall be used by the EEC to discover and select a Media EAS instance to serve media delivery sessions at reference point M4 in the scope of the parent Provisioning Session. (See clause 9.2.3.3.) |
|  | easRelocation‌Requirements | | Client‌EAS‌Relocation‌Requirements | 0..1 | EAS relocation tolerance and requirements.  If absent, the EEC shall assume that relocation is tolerated by all Media EAS instances in the scope of the parent Provisioning Session. (See clause 9.2.3.4.) |
| NOTE 1: In deployments where multiple instances of the Media AF expose the Media Session Handling APIs at reference point M5, the 5G System may use a suitable mechanism (e.g., HTTP load balancing or DNS-based host name resolution) to direct requests to a suitable Media AF instance.  NOTE 2: The Snssai data type is specified in TS 29.571 [33].  NOTE 3: The LocationArea5G data type is specified in TS 24.558 [14]. | | | | | | |

Dynamic Policy API  
Data model

#### 9.3.3.1 DynamicPolicy resource

Table 9.3.3.1-1: Definition of Dynamic Policy Instance resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Property name** | | **Data type** | **Cardinality** | **Usage** | **Description** |
| dynamicPolicyId | | ResourceId | 1..1 | RO | Unique identifier for this Dynamic Policy Instance assigned by the Media AF when the resource is created. |
| provisioningSessionId | | ResourceId | 1..1 | C: RO R: RO U: RO | Uniquely identifies the parent Provisioning Session, which is linked to the Application Service Provider. |
| session‌Id | | MediaDelivery‌SessionId | 1..1 | C: RW R:RO U: RO | Unique identifier of the current media delivery session. |
| policyTemplateId | | ResourceId | 1..1 | C: RW R: RO U: RW | Identifies the Policy Template to be applied to the application flow(s) that fall within the scope of this Dynamic Policy Instance. |
| sliceInfo | | Snssai | 0..1 | C: RW R: RO U: RW | Identifying the target slice in which the Policy Template is instantiated. |
| dataNetworkName | | Dnn | 0..1 | C: RW R: RO U: RW | The name of the target Data Network in which the Policy Template is instantiated. |
| location | | TypedLocation | 0..1 | C: RW R: RO U: RW | The location of the UE when the Dynamic Policy was created or last updated. |
| applicationFlowBindings | | array(Application‌FlowBinding) | 1..1 | C: RW R: RO U: RW | The bindings between application flows at reference point M4 managed within the scope of this Dynamic Policy Instance and their network Quality of Service requirements (see clause 9.3.3.2).  The array shall contain at least one member. |
|  | componentReference | string | 1..1 | C: RW R: RO U: RW | References a particular service component in the Policy Template. |
|  | application‌Flow‌Description | Application‌Flow‌Description | 1..1 | C: RW R: RO U: RW | The Dynamic Policy invoker's specification of an application flow managed by this Dynamic Policy to be used for application traffic identification purposes in the 5G Core (see clause 7.3.3.2).  When PDU Set handling and/or dynamically changing traffic characteristics are required by the Policy Template identified by policyTemplateId, this property shall also specify the media transport protocol parameters to be used by the Media Access Function for PDU Set and/or dynamically changing traffic characteristics signalling purposes.  When media flow multiplexing is in use on the described application flow, this property shall also specify the media identification information parameters to be used by the Media Access Function for multiplexed media identification signalling purposes. |
|  | qos‌Specification | Client‌Policy‌Specification | 0..1 | C: RW R: RO U: RW | The Dynamic Policy invoker's network Quality of Service requirements of the application flow described by application‌Flow‌Description.  If omitted, the default provisioned network Quality of Service requirements of the Policy Template indicated in policyTemplateId shall apply to application‌Flow‌Description. |
| bdtSpecification | | Client‌Bdt‌Specification | 0..1 | C: RW R: RO  U: RW | The Background Data Transfer time windows and traffic limits that apply to this Dynamic Policy (see clause 9.3.3.3). |
| qosEnforcement | | boolean | 1..1 | C: RO R: RO U: RO | Indication that the Quality of Service described in qosSpecification is being enforced by the 5G System.  Populated by the Media AF. |
| l4SEnabled | | boolean | 1..1 | C: RO R: RO U: RO | Indication that ECN marking for L4S functionality is enabled in the 5G System.  Populated by the Media AF. |
| qoSMonitoringEnabled | | boolean | 1..1 | C: RO R: RO U: RO | Indication that QoS monitoring is enabled in the 5G System.  Populated by the Media AF. |
| qoSMonitoringResults | | QosMonitoringReport | 0..1 | C: RO R: RO U: RO | The most recent QoS monitoring results provided by the 5G System. Present only if this feature is currently enabled (as indicated by the qoSMonitoringEnabled property above).  Populated by the Media AF. |
| NOTE: Data type QosMonitoringReport is defined in TS 29.122 [20]. | | | | | |

METRICS REPORTING FORMAT

### 9.5.3 Report format

#### 9.5.3.1 General

Metrics reports shall be submitted by the metrics reporting entity in a format specified by the metrics scheme in question. The Content-Type HTTP request header shall be set in accordance with the specification of the relevant metrics scheme.

Metrics schemes specified by 3GPP shall make provision to convey the media delivery session identifier in their metrics reports. For metrics reporting formats specified elsewhere, the 3GPP specification referencing the metrics scheme should specify a means to convey the media delivery session identifier in metrics reports where practicable.

#### 9.5.3.2 JSON-based metrics reporting envelope

A JSON-based reporting envelope is specified in table 9.5.3.2‑1 below. The OpenAPI YAML syntax of the MetricsReport data type and its subordinate data types is specified in clause A.4.4. QoE metrics reports following the syntax of this reporting envelope shall be identified with the MIME media type application/3gpp-media-delivery-metrics-report+json as registered in clause E.2.

- The version parameter of the MIME media type shall be set to the value "TSG109-Rel19" to indicate compliance with this version of the present document.

Table 9.5.3.2-1: Definition of MetricsReport data type

| Property name | Type | Cardinality | Description |
| --- | --- | --- | --- |
| reportTimestamp | DateTime | 1..1 | Date–time (see NOTE) at which this metrics report was compiled by the metrics reporting entity. |
| sessions | array(MetricsSession) | 1..1 | An array whose members (see table 9.5.3.2‑2) convey metrics for one media delivery session each.  An empty array indicates that there are no active media delivery sessions to report. |
| NOTE: Data type DateTime is specified in TS 29.571 [33]. | | | |

The MetricsSession data type describes a set of metrics samples pertaining to a single active media delivery session.

Table 9.5.3.2-2: Definition of MetricsSession data type

| Property name | Type | Cardinality | Description |
| --- | --- | --- | --- |
| clientId | string | 1..1 | Reporting client identifier, as specified in clause 5.3.5.2. |
| provisioningSessionId | ResourceId | 1..1 | Uniquely identifies the parent Provisioning Session, which is linked to the Application Service Provider. |
| session‌Id | MediaDelivery‌SessionId | 1..1 | Unique identifier of the current media delivery session. |
| content‌Id | string | 0..1 | Identifying the content currently being consumed in the media delivery session, if known.  Populated from the createMediaDeliverySession() method (see clause 11.2.2.1‑1) or from a query parameter of the 3GPP Service URL (see clause 6). |
| samples | array(MetricsSample) | 1..1 | An array whose members (see table 9.5.3.2‑3) convey metrics for this media delivery session.  An empty array indicates that there are currently no samples to report for this media delivery session. |

The MetricsSample data type describes a set of metrics sampled at a particular point in time. This data type is intended to be extended by other specifications.

Table 9.5.3.2-3: Definition of MetricsSample data type

| Property name | Type | Cardinality | Description |
| --- | --- | --- | --- |
| sampleTimestamp | DateTime | 1..1 | Date–time (see NOTE 1) at which the set of metrics was sampled. |
| sliceInfo | Snssai | 0..1 | Identifying the network slice in which the set of metrics were sampled, if applicable |
| dataNetworkName | Dnn | 0..1 | The name of the Data Network in which the set of metrics were sampled, if applicable. |
| mediaStreaming‌ClientData | MediaStreaming‌ClientData | 0..1 | Client data for 5G Media Streaming (see NOTE 2 and below). |
| NOTE 1: Data type DateTime is specified in TS 29.571 [33].  NOTE 2 Data type MediaStreamingClientData is specified in clause 11.4.3.3 of TS 26.512 [6]. | | | |

At least one of the following properties shall be present in a MetricsSample object: mediaStreaming‌ClientData.

Consumption Reportng API (M5)

#### 9.6.3.2 ConsumptionReportingUnit type

This data type represents a single consumption reporting unit.

Table 9.6.3.2-1: Definition of type ConsumptionReportingUnit

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data type | Cardinality | Description |
| mediaConsumed | string | 1..1 | Identifies the media consumed.  Populated from the current content identifier, if set in the Media Session Handler (see table 11.2.3-1 and clause 11.2.2.1) and/or additional identifiers specified outside the present document. |
| clientEndpointAddress | EndpointAddress | 0..1 | The IP address and port number of the Media Access Function endpoint used to access the media consumed (see clause 7.3.3.11).  Present only if access reporting is enabled in the Consumption Reporting Configuration. |
| serverEndpointAddress | EndpointAddress | 0..1 | The IP address, port number and host name of the Media AS endpoint used to access the media consumed (see clause 7.3.3.11).  Present only if access reporting is enabled in the Consumption Reporting Configuration. |
| startTime | DateTime | 1..1 | The time when this consumption reporting unit started. |
| duration | DurationSec | 1..1 | The duration of this consumption reporting unit relative to startTime. The value shall not be negative. Media consumed for less than 1 second should be reported with duration = 0.  For consumption reporting units describing the currently consumed media, this shall indicate the duration so far. |
| sliceInfo | Snssai | 0..1 | Identifying the network slice in which the media was consumed. |
| dataNetworkName | Dnn | 0..1 | The name of the Data Network in which the media was consumed. |
| locations | array(TypedLocation) | 0..1 | A time-ordered list of one or more UE location(s) where the media was consumed during the period of this consumption reporting unit (see clause 7.3.3.8).  Present only if location reporting is enabled in the Consumption Reporting Configuration (only for trusted Media AF). |

Resource update notification channel

### 10.2.3 Notification message format

The Media AF shall format each notification it publishes to the notification channel as an MQTT Application Message conveyed as the payload of an MQTT *PUBLISH* message.

- The *Topic* property of the Variable Header shall be as specified in clause 10.2.2.

- The *Payload Format Indicator* property of the Variable Header shall indicate UTF-8 encoding of the *Payload* field.

The notification message shall be conveyed in the *Payload* field which shall be a formatted as a *NotificationMessage* JSON [37] object as specified in table 10.2.3-1 using the UTF‑8 character encoding. The corresponding OpenAPI [32] definition of this data type is specified in clause A.5.1.

Table 10.2.3‑1: NotificationMessage data type

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Type | Cardinality | Description |
| type | NotificationMessageType | 1..1 | The type of resource carried by this notification message (see table 10.2.3‑2). |
| reason | NotificationReason | 1..1 | The reason for the notification (see table 10.2.3‑3). |
| entityTag | string | 0..1 | Strong entity tag for the resource carried by this notification message.  The value shall be the same as that of the ETag HTTP response header signalled by the Media AF at reference point M5 per clause 7.1.4.2. |
| lastModified | DateTime | 0..1 | The date-time at which the resource carried by this notification message was last modified by the Media AF.  The value shall be the same as that of the Last-Modified HTTP response header signalled by the Media AF at reference point M5 per clause 7.1.4.2. |
| serviceAccessInformation | ServiceAccessInformation | 0..1 | Present if type is NOTIFICATION\_‌SERVICE\_ACCESS\_INFORMATION. |
| dynamicPolicy | DynamicPolicy | 0..1 | Present if type is NOTIFICATION\_‌DYNAMIC\_POLICY\_INSTANCE. |
| networkAssistanceSession | NetworkAssistanceSession | 0..1 | Present if type is NOTIFICATION\_‌NETWORK\_‌ASSISTANCE\_‌SESSION. |

Exactly one of the following properties shall be present: service‌Access‌Information*,* dynamic‌Policy*,* network‌Assistance‌Session.

The type of the notification message shall be indicated using one of the values in table 10.2.3‑2.

Table 10.2.3‑2: NotificationMessageType enumeration

|  |  |
| --- | --- |
| Enumeration value | Description |
| NOTIFICATION\_‌SERVICE\_‌ACCESS\_‌INFORMATION | Notification of a change to a Service Access Information resource. |
| NOTIFICATION\_‌DYNAMIC\_‌POLICY\_‌INSTANCE | Notification of a change to a Dynamic Policy Instance resource. |
| NOTIFICATION\_‌NETWORK\_‌ASSISTANCE\_‌SESSION | Notification of a change to a Network Assistance Session resource. |

The reason for sending the notification message shall be indicated using one of the values in table 10.2.3‑3.

Table 10.2.3‑3: NotificationReason enumeration

|  |  |
| --- | --- |
| Enumeration value | Description |
| NOTIFICATION\_‌REASON\_‌PROVISIONING\_‌UPDATE | The notification is being sent as a result of an update to a Provisioning Session in the Media AF or to one of its subresources (see clause 8). |
| NOTIFICATION\_‌REASON\_‌BACKGROUND\_‌DATA\_‌TRANSFER\_‌WINDOW\_‌CANCELLATION | The notification is being sent because a Background Data Transfer window has been cancelled by the Media AF. |
| NOTIFICATION\_‌REASON\_‌QOS\_‌MONITORING\_‌RESULTS | The notification is being sent because the Media AF has received QoS monitoring results from the 5G Core. |

Media Session Handler client API (M6/M11)

#### 11.2.2.1 Create a media delivery session

A 3GPP Service URL (see clause 6) may be used to implicitly trigger the creation of a new media delivery session with the Media Session Handler.

The Media Session Handler also offers the explicit createMediaDeliverySession() method, which is used to create a new media delivery session in the Media Session Handler.

The input parameters of the method are specified in table 11.2.2.1‑1:

Table 11.2.2.1‑1: Input parameters for createMediaDeliverySession() method

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | O | Description |
| serviceId | string | M | The external service identifier (see table 8.2.3.1‑1) of the Provisioning Session that this media delivery session pertains to. |
| contentId | string | O | A content identifier for the media to be consumed in this media delivery session. |
| entryPoint | Url | O | The location of a Media Entry Point document or media resource. |
| domainNames | array(string) | O | A set of Fully-Qualified Domain Name (FQDN) of the Media AS endpoint(s) supporting the media delivery session at reference point M4. |
| accessToken | string | O | An access token that the Media Session Handler presents to the Media AF to authorise invocation of media session handling operations at reference point M5. |

If it does not already have a fresh copy cached, the Media Session Handler shall attempt to retrieve a copy of the full Service Access Information from the Media AF at reference point M5 using the procedure specified in clause 5.3.2.

If successful, the Media Session Handler shall assign a new media delivery session identifier to the media delivery session and shall create an entry in its *\_status* array indexed by the media delivery session identifier.

If the entryPoint input parameter is provided, the Media Session Handler shall attempt to initialise the Media Access Function using an appropriate method, and shall pass the Media Entry Point URL to it (as well as the media delivery session identifier) in order to initiate media access.

If the entryPoint input parameter is provided, and indicates a Service Operation Point, the Media Session Handler shall create a Dynamic Policy Instance using the procedure specified in clause 5.3.3 using the Service Operation Point reference as the external reference. The Dynamic Policy Instance shall include a Policy Template binding for each of the domain names listed in the domainNames input parameter, if present.

If all of the above actions are successful, the Media Session Handler shall set sessionHandlingState to ACTIVE (see table 11.2.3‑1) and shall send a SESSION\_‌HANDLING\_‌ACTIVATED notification (see table 11.2.3‑2). If any of the above actions fail, the Media Session Handler shall set sessionHandlingState to ERRORED (see table 11.2.3‑1).

The return value of the method is specified in table 11.2.2.1‑2.

Table 11.2.2.1‑2: Return value for createMediaDeliverySession() method

|  |  |
| --- | --- |
| Type | Description |
| string | The media delivery session identifier. |

### 11.2.3 General Media Session Handler information

Table 11.2.3-1 specifies the status information that can be obtained from the Media Session Handler for a particular media delivery session it is managing.

Table 11.2.3-1: General Media Session Handler Status Information

|  |  |  |  |
| --- | --- | --- | --- |
| Status | Type | Parameter | Definition |
| contentIdentifier | string |  | The content identifier currently associated with this media delivery session. |
| sessionHandlingState | string enum |  | The status of this media delivery session:  ACTIVE: The media delivery session is being handled by the Media Session Handler.  ERRORED: An error has occurred, and the Media Session Handler is no longer able to handle it. |

Table 11.2.3-2 provides a list of general notification events exposed by the Media Session Handler through reference points M6 and M11.

Table 11.2.3-2: General Media Session Handler Notification Events

|  |  |  |
| --- | --- | --- |
| Event | Definition | Payload |
| SESSION\_HANDLING\_ACTIVATED | Triggered when media session handling was activated for a specific Media Entry Point. | Media delivery session identifier, Media Entry Point URL. |
| SESSION\_HANDLING\_TERMINATED | Triggered when media session handling is terminated for a specific Media Entry Point. | Media delivery session identifier, Media Entry Point URL. |
| STREAMING\_ACCESS\_UPDATED | Triggered when an update to the stream access is available for the Provisioning Session associated with the external service identifier supplied when the media delivery session was created (see clause 10.2.2.1). | Media delivery session identifier, Streaming access. |
| RTC\_CLIENT\_CONFIGURATION\_UPDATED | Triggered when an update to the RTC Client configuration is available for the Provisioning Session associated with the external service identifier supplied when the media delivery session was created (see clause 10.2.2.1). | Media delivery session identifier, RTC Client configuration. |

Table 11.3.3-3 provides a list of general error events exposed by the Media Session Handler through reference points M6 and M11.

Table 11.2.3-3: General Media Session Handler Error Events

|  |  |  |
| --- | --- | --- |
| Status | Definition | Payload |
| ERROR\_SESSION\_HANDLING | Triggered when there is an error in the media session handling. | Media delivery session identifier. |

Dynamic Policy client API (M6/M11)

#### 11.3.1.2 Activate Dynamic Policy

The *activatePolicy()* method is invoked to request the application of a dynamic policy to a media delivery session that is configured at the Media Session Handler. The scope of the dynamic policy is all application flows that match the Media AS domain name declared when the media delivery session was created (see table 11.2.2.1‑1). The application may also provide the estimated transfer volume if the media delivery session is expected to be within the bounds of a Background Data Transfer time window.

The input parameters of the method are specified in table 11.3.1.2‑1.

Table 11.3.1.2-1: Input parameters for activatePolicy() method

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | O | Description |
| sessionId | string | M | The media delivery session identifier (as specified in clause 7.3.2) of an initialised media delivery session in the Media Session Handler. |
| serviceOperationPointReference | string | M | The external reference identifier of a Service Operation Point that uniquely identifies a Policy Template within the context of sessionId. |
| estimatedTransferVolume | integer | C | The estimated volume of data to be transferred, expressed in bytes.  Minimum value 1 byte.  Required to be populated when the Policy Template corresponding to the referenced Service Operation Point declares a Background Data Transfer policy. |

The Media Session Handler conveys the request to the Media AF and provides the corresponding response to the invoker of the method.

The Media Session Handler may enable ECN marking for L4S and/or QoS monitoring as a side-effect of this method (see clause 5.3.3.2).

The anonymous return value of the method is specified in table 11.3.1.2‑2.

Table 11.3.1.2-2: Return value for activatePolicy() method

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | | Type | O | Description |
| — | | object | C | Information about the activated Dynamic Policy.  Null if the method invocation is unsuccessful. |
|  | recommendedDownlinkBitRate | BitRate | M | The recommended downlink bit rate for the requested Service Operation Point. |
|  | recommendedUplinkBitRate | BitRate | M | The recommended uplink bit rate for the requested Service Operation Point. |
|  | grantedBackgroundDataTransferWindows | array(TimeWindow) | M | Indicates the time window(s) for which Background Data Transfer has been successfully activated. |
|  | l4SEnabled | boolean | M | Indicates whether ECN Marking for L4S functionality has been successfully activated by both the Media AF and by the Media Access Function for the media delivery session. |
|  | qoSMonitoringEnabled | boolean | M | Indicates whether QoS monitoring has been successfully activated by the Media AF for the media delivery session. |

The Media Session Handler shall additionally send the *L4S\_ENABLED* notification (see table 11.3.2-2) if the *l4SEnabled* flag above is *true*.

The Media Session Handler shall additionally send the *QOS\_MONITORING\_ENABLED* notification (see table 11.3.2-2) if the *qoSMonitoringEnabled* flag above is *true*.

### 11.3.2 Dynamic Policy information

Table 11.3.2-1 specifies the status information that can be obtained from the Media Session Handler.

Table 11.3.2-1: Status Information relating to Dynamic Policies

|  |  |  |  |
| --- | --- | --- | --- |
| Status | Type | Parameter | Definition |
| currentDynamicPolicies[mediaDeliverySession] | object |  | Descriptions of the Dynamic Policies currently instantiated for each current media delivery session, including the external reference identifier of its Service Operation Point, details of applicable Background Data Transfer quotas, if any, enablement of ECN marking for L4S functionality, enablement of QoS monitoring and the most recently received QoS monitoring results. |

Table 11.3.2-2 provides a list of general notification events exposed by the Media Session Handler.

Table 11.3.2-2: Notification Events relating to Dynamic Policies

|  |  |  |
| --- | --- | --- |
| Event | Definition | Payload |
| POLICY\_ACTIVATED | Triggered when a new Dynamic Policy is successfully activated for the media delivery session. | Media delivery session identifier, Service Operation Point reference, (Background Data Transfer window start,) (Background Data Transfer window end,) Recommended downlink bit rate, Recommended uplink bit rate. |
| POLICY\_DEACTIVATED | Triggered when the Dynamic Policy for this media delivery session is deactivated. | Media delivery session identifier, Service Operation Point reference. |
| BACKGROUND\_DATA\_TRANSFER\_OPPORTUNITY | Triggered when a new Background Data Transfer opportunity is notified to the Media Session Handler by the Media AF (see clause 10.2). | Media delivery session identifier, Service Operation Point reference, Background Data Transfer window start, Background Data Transfer window end. |
| L4S\_ENABLED | Triggered when the Media AF confirms that ECN Marking for L4S is successfully activated in the 5G System for the media delivery session. | Media delivery session identifier. |
| QOS\_MONITORING\_ENABLED | Triggered when the Media AF confirms that QoS monitoring is successfully activated in the 5G System for the media delivery session. | Media delivery session identifier |
| QOS\_MONITORING\_RESULTS | Triggered when QoS monitoring results are notified to the Media Session Handler by the Media AF. | Media delivery session identifier, QoS monitoring results. |

Table 11.3.3-3 provides a list of error events exposed by the Media Session Handler through reference points M6 and M11 in relation to Dynamic Policies.

Table 11.3.2-3: Error Events relating to Dynamic Policies

|  |  |  |
| --- | --- | --- |
| Status | Definition | Payload |
| ERROR\_INVALID\_‌SERVICE\_‌OPERATION\_‌POINT | Triggered when the provided Service Operation Point reference is not valid for the media delivery session. | Media delivery session identifier, Service Operation Point reference. |
| ERROR\_UNAUTHORISED | Triggered when the application is not authorised to instantiate a dynamic policy for the provided Service Operation Point reference. | Media delivery session identifier, Service Operation Point reference. |
| ERROR\_BACKGROUND\_DATA\_TRANSFER | Triggered when there is an error during a Background Data Transfer, for example if it is cancelled before the end of the advertised opportunity window. | Media delivery session identifier, Error reason. |

3GPP Forge Tag bump

# A.1 General

The normative code specifying the APIs defined in clauses 7.3, 8, 9 and 10 of the present document, including JSON Schema [38] representations of HTTP message bodies to be used with these APIs, is published on 3GPP Forge according to the OpenAPI 3.0.0 specification [32]. The YAML files corresponding to this version of the present document shall be published to the following location:

https://forge.3gpp.org/rep/all/5G\_APIs/-/tags/TSG109-Rel19

Informative copies of these YAML files shall be distributed with the present document for convenience only. Where any discrepancy exists, the version on 3GPP Forge shall be considered definitive.

QoS Mappings at reference point N5/N33

## D.1.2 QoS mapping for Dynamic Policy at reference point N5

When the Media AF directly invokes the Npcf\_PolicyAuthorization service at reference point N5 according to TS 29.514 [18], each DynamicPolicy resource is mapped by the Media AF to an Application‌Session‌Context resource in the PCF.

Two alternative implementation options exist for the mapping of the ApplicationFlowBinding object by the Media AF:

1. Each Application‌Flow‌Binding object of the Dynamic Policy Instance (each one representing a distinct Service Component) is associated with a different Media‌Component object in the PCF, as shown in figure D.1.2‑1. A single Media‌SubComponent is created to describe the downlink and/or uplink aspects of that Service Component.

NOTE 1: As specified in clause 5.5.3.3.3, the dynamic traffic characteristics (i.e., data burst size, time to next burst and expedited transfer indication) are mapped to the dat‌Burst‌Size‌Ind, time‌to‌Next‌Burst‌Ind, and exp‌Tran‌Ind properties respectively of a Media‌Component object. These reflect the values of corresponding Policy‌Constraints properties downlink‌Data‌Burst‌Size‌Marking‌Required, downlink‌Time‌To‌Next‌Burst‌Marking‌Required, and respectively, of the corresponding Application‌Flow‌Binding’s client QoS specification of downlink‌Expedited‌Transfer‌Indication. When any of these are present, the mediaTransportParameters are further associated with the protoDescDl property of the Media‌Component object.

2. In the limited case where all Service Components share the same minimum desired bit rate, minimum requested bit rate, PDU Set QoS requirements and dynamic traffic characteristics (data burst size and/or time to next burst) marking, and none of the Policy‌Constraints objects cites a qosReference, each Application‌Flow‌Binding object of the Dynamic Policy Instance (each one representing a distinct Service Component) is associated with a different Media‌Sub‌Component object in the PCF, and these all share a common parent Media‌Component object, as shown in figure D.1.2-2.

NOTE 2: The dynamic traffic characteristic of expedited transfer indication is not applicable to this limited case as different QoS requirements are expected between corresponding expedited and non-expedited Application‌Flow‌Binding objects.

In both options, the descriptions of the downlink and/or uplink application flow are populated in the fDescs array of the MediaSubComponent unless a qosReference is cited in the corresponding Policy‌Constraints.



Figure D.1.2‑1: General case mapping of ApplicationFlowBinding to PCF MediaComponent at reference point N5



Figure D.1.2‑2: Limited case mapping of ApplicationFlowBinding to PCF MediaSubComponent at reference point N5

## D.1.3 QoS mapping for Dynamic Policy at reference point N33

When the Media AF invokes the Nnef\_AFsessionWithQoS service at reference point N33 according to TS 29.522 [19] and TS 29.122 [20], each DynamicPolicy resource is mapped by the Media AF to an AsSession‌WithQoS‌Subscription resource in the NEF. The qosReference, protoDescDl, protoDescUl, pduSetQosDl and pduSetQosUl properties are not populated in this resource; the QoS requirements of the Service Component are instead populated in the AsSession‌Media‌Component object.

Each Application‌Flow‌Binding object of the Dynamic Policy Instance (each one representing a distinct Service Component) is associated with a different AsSession‌Media‌Component object in the NEF, as shown in figure D.1.3‑1.

The QoS requirements of the Service Component are instead populated in the AsSession‌Media‌Component.

The descriptions of the downlink and/or uplink directions of the application flow corresponding to the Service Component are populated in the flowInfos array of the AsSession‌Media‌Component unless a qosReference is cited in the corresponding Policy‌Constraints object.



Figure D.1.3‑1: Mapping of ApplicationFlowBinding to NEF AsSessionMediaComponent at reference point N33

IANA registration

Annex E (normative):  
IANA registrations

# E.1 General

This annex provides the formal registrations of MIME media types for different resources specified in the present document. Each registration is referenced from the registry at <http://www.iana.org/assignments/media-types>.

# E.2 Registration of MIME media type for JSON-based media delivery metrics reporting envelope

## E.2.1 General

The MIME media type specified in table E.2.1-1 below denotes that the message body is a JSON instance document compliant with the JSON-based media delivery metrics reporting envelope, the syntax of which is specified in clause 9.5.3.2.

Table E.2.1‑1: MIME media type registration for  
JSON-based media delivery metrics reporting envelope

|  |  |  |
| --- | --- | --- |
| Parameter | | Value |
| MIME media type name | | application |
| MIME subtype name | | 3gpp-media-delivery-metrics-report+json |
| Required parameters | | version (see clause E.2.2 of 3GPP TS 26.510). |
| Optional parameters | | None. |
| Encoding considerations | | This is a JSON document, and the encoding considerations are the same as for media type application/json defined in IETF RFC 8259. |
| Security considerations | | This media format is used to report Quality of Experience metrics in 3GPP Media Delivery Systems such as the 5G Media Streaming (5GMS) System.  This format is highly susceptible to manipulation or spoofing for attacks designed to inject fake metrics. Both integrity protection and source authentication are recommended to prevent misleading of the recipient. |
| Interoperability considerations | | The specification defines a platform-independent metrics reporting document format, and it is intended that wide interoperability can be achieved. |
| Published specification | | 3GPP TS 26.510 clause 9.5.3.2 |
| Applications which use this media type | | 3GPP 5GMS-based applications and services |
| Fragment identifier considerations | | The provisions of RFC 6901 (JSON Pointer) apply. |
| Restrictions on usage | | None |
| Provisional registration? | | No |
| Additional information | Deprecated alias names | None |
| Magic number(s) | None |
| File extension(s) | json |
| Macintosh File Type Code(s) | None |
| Object Identifier(s) of OID(s) | None |
| Intended usage | | COMMON |
| Other information and comments | | None |
| Contact person | Contact name | Dongwook Kim |
| Contact e-mail address | dongwook.kim@etsi.org |
| Author/Change controller | 3GPP TSG SA WG4 |

## E.2.2 Version parameter

Table E.2.2-1 specifies the version parameter to be used with the MIME media type registration in clause E.2.1.

Table E.2.2‑1: Specification of version parameter

|  |  |
| --- | --- |
| Parameter | Value |
| Parameter name | version |
| Parameter value | A comma-separated list of versions of the Metrics Report schema to which the document conforms. The value is specified in clause 9.5.3.2 of 3GPP TS 26.510 and encodes the last 3GPP release in which a change to the document schema was approved.  The purpose of the parameter is to allow schema conformance to be assessed by a recipient before attempting to parse the contents of a received document. |

EXAMPLE: application/3gpp-media-delivery-metrics-report+json;version="**Rel19**"

End of changes