**3GPP TSG-SA WG4 Meeting ad hoc post #121 S4aI230022**

**Electronic Meeting, 8 December 2022–10 February 2023**

Title: Discussion on Service URLs and Media Session Handler launching

Source: BBC

Agenda Item: 2.4 (5GMS\_Ph2)

Document for: Discussion and agreement

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# Abstract

The 5G Media Streaming architecture defined in TS 26.501 [1] describes a high-level call flow in which the 5GMSd-Aware Application explicitly launches a downlink stream session by passing a Media Player Entry URL to the Media Player. This action implicitly launches the Media Session Handler in the 5GMS Client to manage 5GMS features during the course of the downlink streaming session.

This paper analyses the leading proposal through the lens of a worked example in order to better assess its suitability.

# Background

TS 26.501 [1] defines procedures and call flows for media session handling. In particular, its figure 5.2‑2 describes the call flow for downlink media streaming of MPEG‑DASH content.

The preferred way of launching a Media Streamer (such as the downlink Media Player) is by its existing launch mechanism, which expects a media entry point – such as the URL of a MPEG‑DASH MPD – to be passed as a parameter in step 3 of the call flow reproduced below.



TS 26.501 figure 5.2-2: High-level procedure for DASH content (extract)

With this approach, however, the problem remains of how the 5GMS Client’s Media Session Handler becomes aware of the fact that a new session has launched that can benefit from the enhancements available with 5G Media Streaming. The Media Session Handler is launched implicitly, as indicated by the dotted extension line in step 3 of the call flow.

Furthermore, in order to discover which 5GMS features are provisioned (content hosting, consumption reporting, metrics reporting, dynamic policies…), the Media Session Handler needs to acquire Service Access Information from the 5GMS Application Function (step 4 in the above call flow) using the Provisioning Session ID as a URL path parameter.

Contribution S4aI230016 [4] proposes to document a new Key Issue in the feasibility study on potential 5GMS extensions in TR 26.804 [3]. In particular, it recommends “Solution 1”, outlined in clause 5.13.5.1 of which exploits a URL launch mechanism in the mobile operating system (e.g. “Android App Links”) to implicitly launch the Media Session Handler when certain types of URL (e.g. an MPEG‑DASH MPD) are requested to be fetched by an application (here, the 5GMS-Aware Application). In order for this to work, the Media Session Handler must declare in advance which URLs it wishes to “handle” (e.g. by means of a so-called “Intent filter” declared in the Android application manifest that is distributed in the application installation package).

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| In order to address the cases in clause 5.13.4, it is proposed to:- Register an Internet domain name for 3GPP services as part of 3GPP specifications such that they can be referenced under a controlled URL, e.g. [http://services.3gpp.org](http://services.3gpp.org.com) and https://services.3gpp.org.- Verify ownership of the domain through one of the Android website association methods.- Create a website/redirection mechanism in case the application is not available on the device.- The URL itself needs to be constructed in order to resolve to the main service and may include the URL to the main service as well.- Specify an application that realises the UE-based 3GPP Service Handler which declares an intent filter so that the application acts as the default handler for the 3GPPP Services domain name registered above. The intent filter includes the following declarations:- The DEFAULT category to allow the application to respond to implicit intents. - The BROWSABLE category in order for the intent filter to be invoked when clicking a link in a browser.- <data> tags including the android:scheme attribute for both HTTP and HTTPS.- A <data> tag including the android:host attribute with the registered 3GPP Services domain.- Verify ownership details see [here](https://blog.branch.io/how-to-open-an-android-app-from-the-browser-2/).An example intent filter is provided below:

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| --- |
| <intent-filter android:autoVerify="true">    <action android:name="android.intent.action.VIEW" />    <category android:name="android.intent.category.DEFAULT" />    <category android:name="android.intent.category.BROWSABLE" />    <data android:scheme="http" />    <data android:scheme="https" />    <data android:host="services.services.3gpp.org.org" /></intent-filter> |

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# Worked example

The following table attempts to provide a concrete realisation for each step in the proposed call flow description in order to better understand proposed Solution 1:

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| --- | --- |
| **Step** | **Example realisation** |
| 1. UE may install a background "helper" application (the 3GPP Service Handler) with an intent filter that declares an interest in the 3GPP Services domain. | * Assume the Media Session Handler is not part of the 3GPP Service Handler application.
* Could the 3GPP Service Handler application be listed as a dependency of the Portal Application so that it is installed automatically, avoiding the need for step 8?
 |
| 2. 5GMS Application Provider has a service with an entry point URL. | Is the Media Application Provider really the 5GMS Application Provider (to use proper nomenclature from TS 26.501 [1])? Shouldn’t the Key Issue stick to established terminology?Example media entry point URL:[https://www.bbc.co.uk/‌sounds/‌play/‌p0bc3rjy](https://www.bbc.co.uk/sounds/play/p0bc3rjy) |
| 3. 5GMS Application Provider negotiates all service parameters with the 5G System (provisioning). | Invocations of the 5GMS Application Function RESTful API at reference point M1:* M1\_ProvisioningSessions\_createProvisioningSession.
* M1\_ContentHostingProvisioning\_createContentHostingConfiguration
	+ Includes abovementioned media entry point URL.
 |
| 4. 5GMS Application Provider creates a bootstrapping URL (much like a landing page URL).- [http://services.3gpp.org/<service](http://3gpp-services.com/%3Cservice) parameters>/<URL to application service> | Is *<URL to application service>* intended to be the media entry point URL? If so, this could be clarified.Example “bootstrapping” composite 3GPP Service URL with media entry point URL embedded as final path element:https://services.3gpp.org*/‌<service parameters>*/‌https%3A%2F%2F‌www.bbc.co.uk%2F‌sounds%2F‌play%2F‌p0bc3rjyWhat *<service parameters>* are envisaged?* Does there need to be a special parameter to indicate that 5G Media Streaming needs to be bootstrapped?
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| 5. 5GMS Application Provider provides to its 5GMS-Aware Application (as well as to search engines, etc.):- Only the 3GPP Service URL, if the service requires the 3GPP service launch.- Both URLs, i.e. the one to the OTT service and the 3GPP Service URL, if the 3GPP service is only an enhancement to launch the third-party service. | Are the Media Application and Portal Application really the 5GMS-Aware Application (to use proper nomenclature from TS 26.501 [1])? Is there any need to distinguish them in the context of the Key Issue? Shouldn’t the Key Issue stick to established terminology?It’s unrealistic that back-end content management systems would be changed to list a 3GPP Service URL alongside (or instead of) the conventional media entry point URL, especially since the same deep link URL is typically used across all platforms (e.g. web) in addition to being consumed by mobile apps.Second best would be for the 5GMS-Aware Application to construct the 3GPP Service URL using the simple recipe above. But then the benefits of transparency are then lost. |
|  |
|  | There appears to be a missing step here. Choose one of the following two designs:1. The Portal Application registers the media entry point URL (or a prefix of it) with the **3GPP Service Handler**. It also provides a mapping from this URL (prefix) to baseline Service Access Information parameters for 5G Media Streaming (i.e. 5GMS Application Function host addresses and a Provisioning Session Identifier).
2. The Portal Application registers the media entry point URL (or a prefix of it) with the 5GMS **Media Session Handler** using a (currently missing) M6 API method register(). It also provides a mapping from this URL (prefix) to baseline Service Access Information parameters for 5G Media Streaming.

Again, this means that the 5GMS-Aware Application isn’t completely transparent. But this is simply documenting its awareness of 5G Media Streaming. |
| 7. When the URL is selected in the Portal Application, the 3GPP Service Handler application starts up in the background and:- Uses the service parameters to establish the 3GPP service in the background (if appropriate or available) and potentially connects to the network.- Uses the URL to the application service and launches the application service. | This step corresponds to steps 3 and 4 in TS 26.501 figure 5.2-2Thinking about a BBC Sounds example, the actions would be:* Portal Application speculatively constructs 3GPP Service URL for 5G Media Streaming using recipe and sends background request for this URL. If the 3GPP Service Handler is installed, it is invoked thanks to its registered intent filter.
	+ The 3GPP Service Handler needs to call a (currently missing) M6 API method initiate() that invokes the Media Session Handler with appropriate starting parameters. Choose one of the following two designs:
		- The 3GPP Service Handler maps the media entry point URL into the 5GMS baseline Service Access Information parameters required by the Media Session Handler (i.e., the M5 request URL, including 5GMS host address and Provisioning Session ID), or
		- The 3GPP Service Handler passes the media entry point URL verbatim across M6 and the Media Session Handler maps that URL into the 5GMS baseline Service Access Parameters using an internal mapping set earlier using the (currently missing) M6 API method register().
	+ The Media Session Handler retrieves Service Access Information for the relevant Provisioning Session ID.
		- This retrieval may cause 5GMS content preparation activities to be initialised by the 5GMS Application Function.
* Portal Application launches Media Player (e.g. embedded Exoplayer) with media player entry point URL.
 |
| 8. If the 3GPP Service Handler application is not installed:- A network service is called and runs the service URL resolution. In the simplest case, this resolution redirects to the media service or- a 404 is returned by the Operating System and the Portal Application either terminates the service or uses the alternate over-the-top entry point. |  |

# Summary

1. It is not realistic to expect the 5GMS-Aware Application to retrieve a 3GPP Service URL from the 5GMS Application Provider because existing (over-the-top) content catalogues deal only with private identifiers and/or media entry point URLs. However, a 5GMS-Aware Application might realistically be able to construct a 3GPP Service URL programmatically in order to facilitate the launch of the 5GMS Media Session Handler. This is not an entirely transparent solution to the application but might be the best that can be achieved in practice.
2. An additional step is needed in the proposed solution to supply the Media Session Handler with the baseline Service Access Information parameters (i.e., 5GMS Application Function host addresses and Provisioning Session ID) that it needs to retrieve Service Access Information at reference point M5. This could take the form of a new M6 API method on the Media Session Handler.
3. An additional step is needed in the proposed solution to enable the 3GPP Service Application to initiate media session handling by the Media Session Handler.

# Proposal for agreement

It is proposed that SA4 agrees to take into account the example in section 2 of this contribution and the summary in section 3.

# References

[1] 3GPP TS 26.501: "5G Media Streaming architecture", Release 17.

[2] 3GPP TS 26.512: "5G Media Streaming (5GMS); Protocols".

[3] 3GPP TR 26.804: "Study on 5G Media Streaming Extensions".

[4] Qualcomm Incorporated, S4aI230016 TR 26.804 CR0003r2: "Service URLs".