



# Considerations on SA2 R19 study and SID proposals

Source: Xiaomi



A full smart life solution





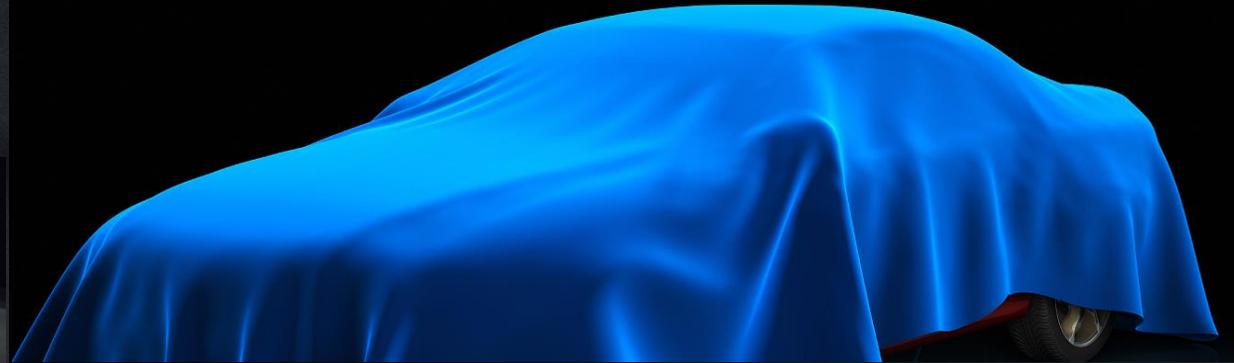
Core strategy

Smartphone × AIoT





To be commercialized in 2024



# CyberDog

Bio-inspired Quadruped Robot





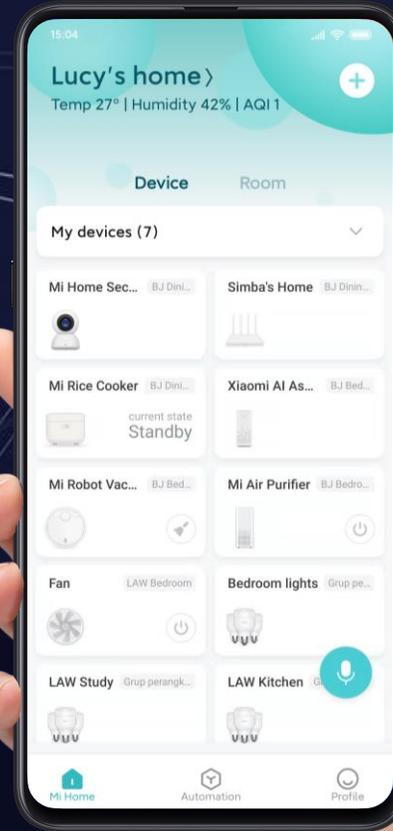
# Sensing



home intrusion detection



08:45 PM



• AQI 92

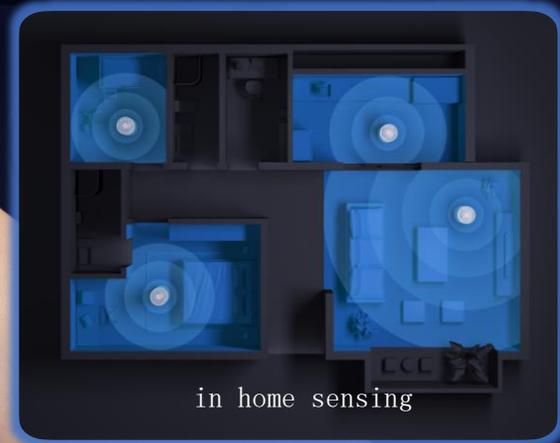
• Temperature 25 (indoor)

• Temperature 25.5 (outdoor)

• Humidity 57%

• Temperature 25.5 (indoor)

• Humidity 59%



in home sensing



## V2X/Robot

- Integrated Sensing and Communication
- Ranging\_SL Phase II (TEI19?)



## AI/ML

- AI-enabled 5GS



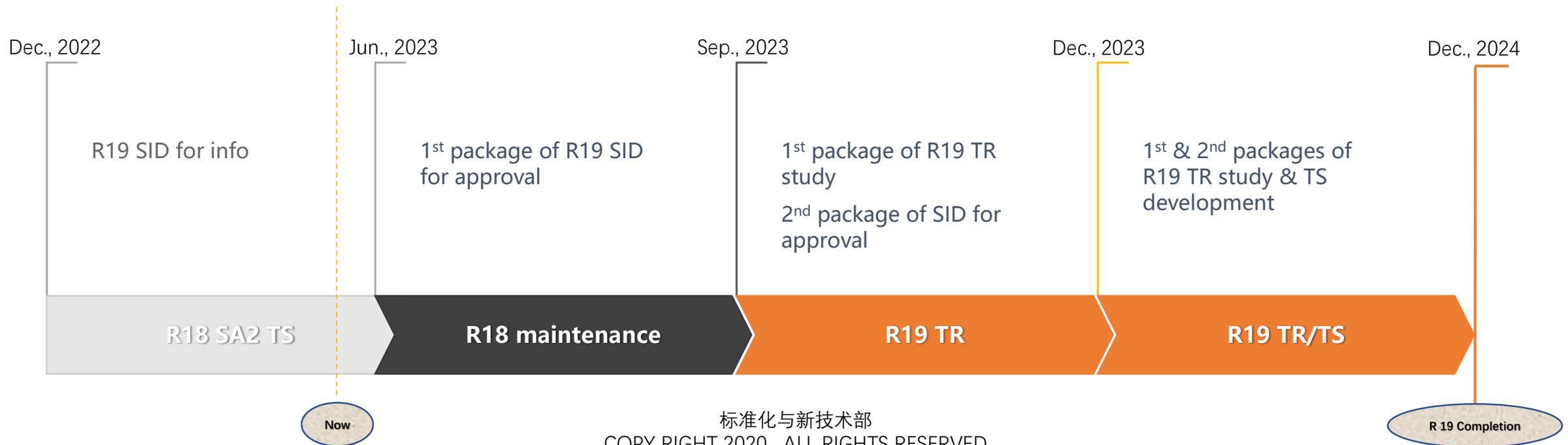
## Handset x AIoT

- Integration of satellite components in the 5G architecture Phase III

Our business motivation

# R19 timeline and high level principles

- R19 phase: 15 months (1<sup>st</sup> package) or 12 month (2<sup>nd</sup> package)
- To avoid prioritization in Dec. 2023, it is expected that an up-limit number is set for the overall R19 package by SA2 leadership
- Up-limit number for the 1st package is not necessary, but only some of them (e.g. high TU number SIDs) can start the work from Sep. SA2 leadership may determine how many SIDs can be studied from Sep.
- For the approval of 1<sup>st</sup> package R19 SID, new feature SIDs have higher priority than phase 2/3/4 SIDs



# Xiaomi R19 SID proposals

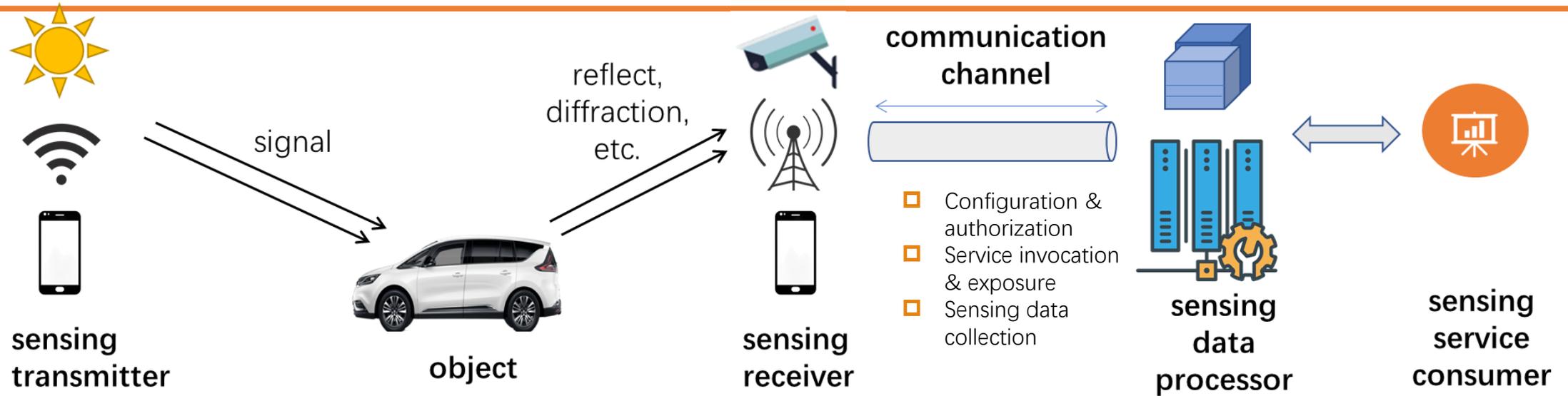


- Integrated Sensing and Communication
- AI enabled 5G System
- Integration of satellite components in the 5G architecture Phase III



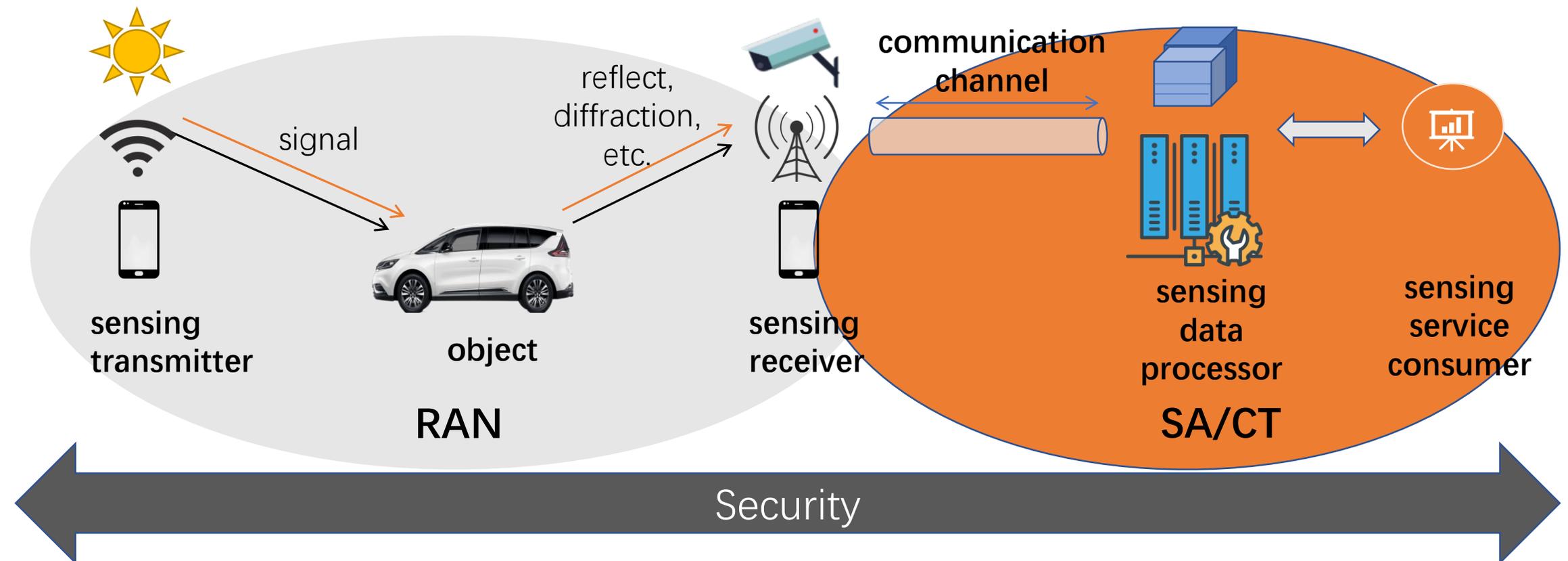
# Integrated Sensing and Communication

# Key components of sensing system



- Sensing transmitter
- Sensing receiver
- Communication channel
- Sensing data processor
- Sensing service consumer

# Work split between RAN WGs and SA/CT WGs



- ❑ Measurement: signaling procedure for controlling the measurement, signal transmission/receiving
- ❑ Performance evaluation (5G-NR)

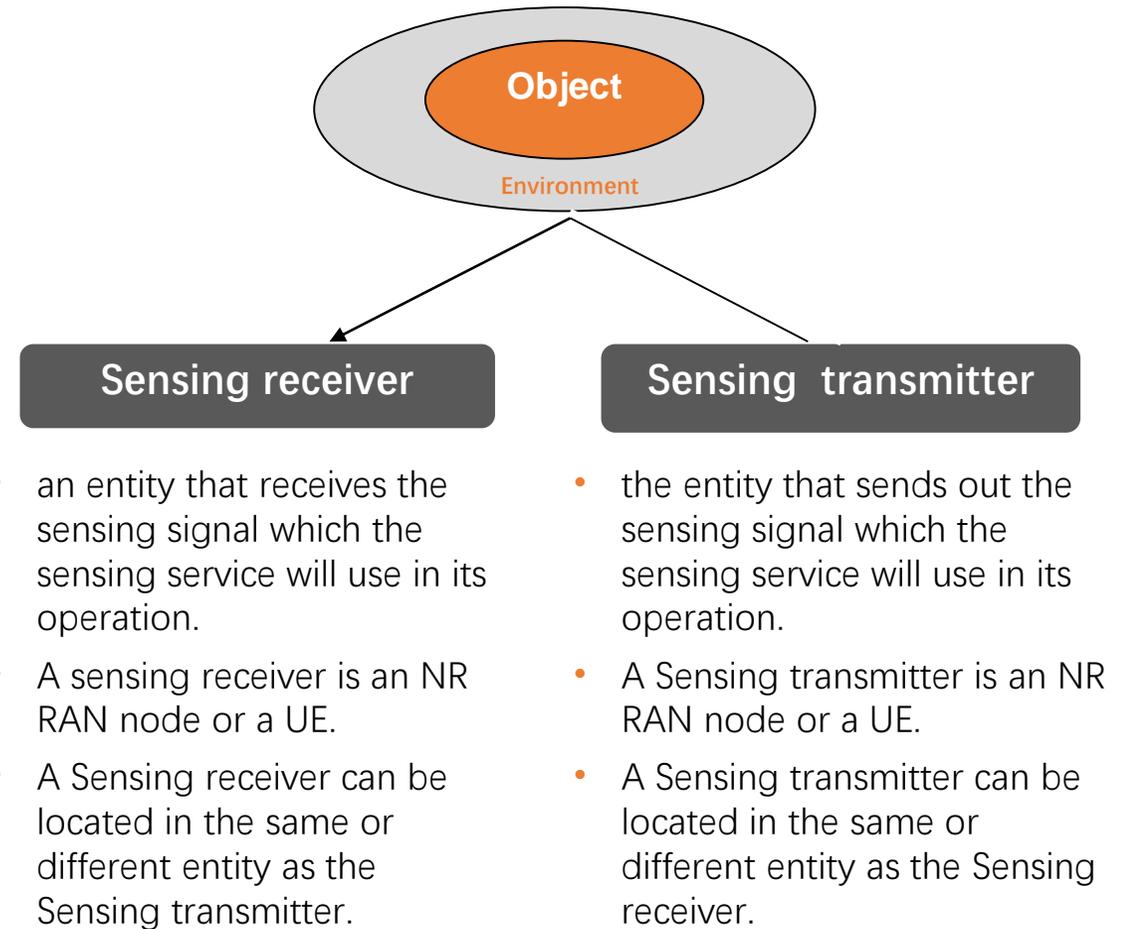
- ❑ Configuration & authorization
- ❑ Service invocation & exposure
- ❑ Sensing data (3GPP/non-3GPP) collection
- ❑ Sensing data (3GPP/non-3GPP) processing
- ❑ Charging

## Concept

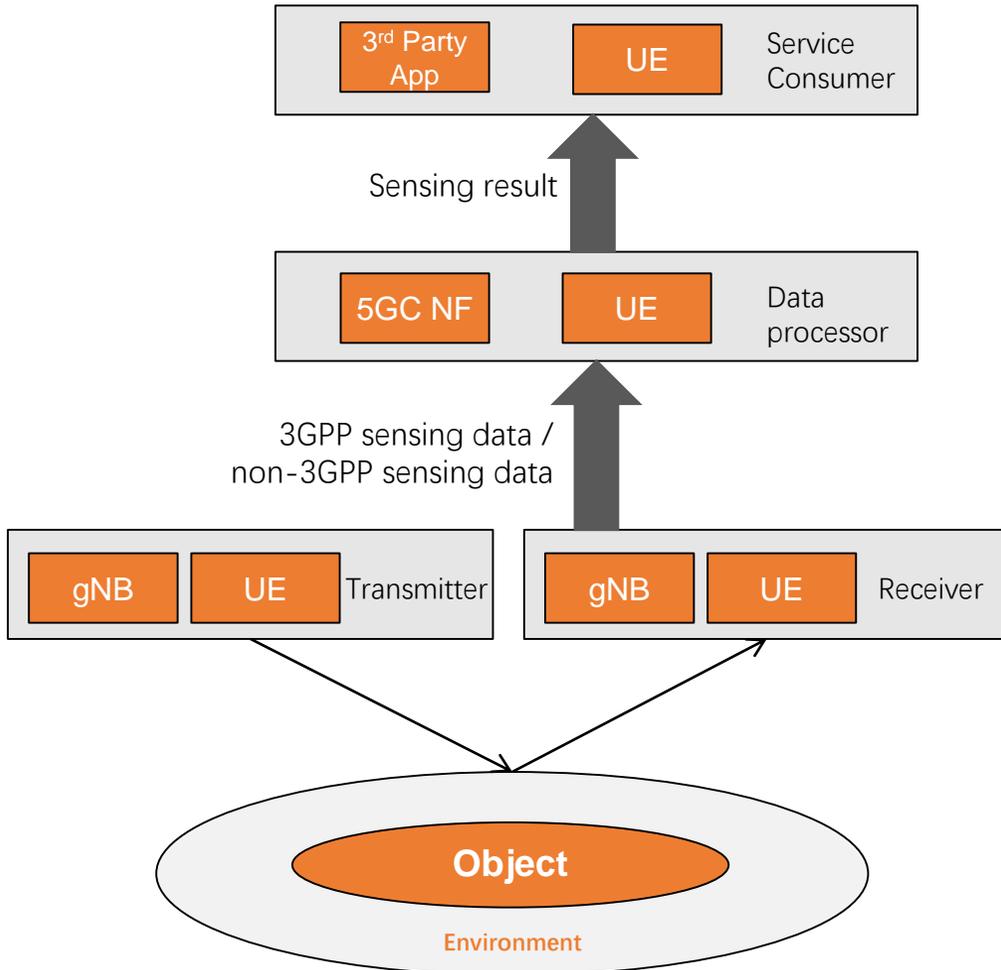
**5G Wireless sensing:** 5GS feature providing capabilities to get information about characteristics of the environment and/or objects within the environment (e.g. shape, size, orientation, speed, location, distances or relative motion between objects, etc) using NR RF signals and, in some cases, previously defined information available in EPC and/or E-UTRA.

## Scope & Scenarios

- Served or not served by NG-RAN
- Licensed or unlicensed spectrum
- 5G NR RF, non-RF, and previously defined information available in EPC and/or E-UTRA (no impact to EPC/E-UTRA is assumed)
- UE on board target object or non-UE on board target object
- Commercial, V2X, public safety and emergency services



# Potential Architecture Impacts

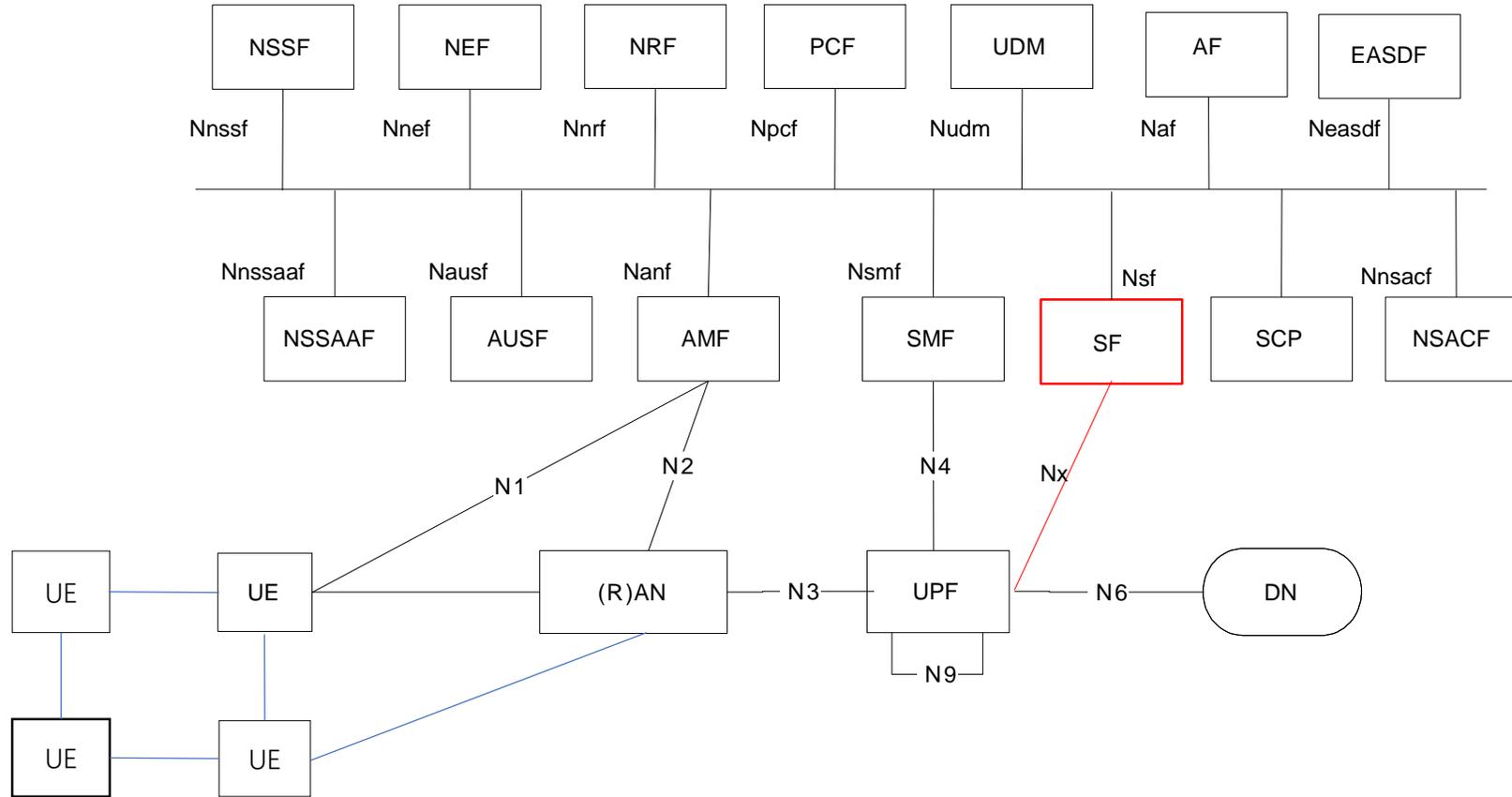


- ❑ **Sensing result:** processed 3GPP sensing data requested by a service consumer.
  - ❑ **3GPP sensing data:** Data derived from 3GPP radio signals impacted (e.g. reflected, refracted, diffracted) by an object or environment of interest for sensing purposes, and optionally processed within the 5G system.
  - ❑ **non-3GPP sensing data:** Data provided by non-3GPP sensors (e.g. video, LiDAR, sonar) about an object or environment of interest for sensing purposes.
- Source: TR 22.837

- Sensing result can be requested and exposed to 3<sup>rd</sup> party App or UE
  - ❑ Sensing result may include the final result or the processed sensing data per request of service consumer
- Sensing data can be processed at the 5GC NF or at UE
  - ❑ 5GC NF in the figure performs sensing measurement data processing, which can be a new NF or an existing NF
- Based on sensing option(s) adopted, transmitter/receiver may be gNB or UE
- Based on sensing option(s) adopted, a communication channel (over CP or UP) may be established between gNB and the data processor or between UE and the data processor
- UE(s) shown in the figure does not have to be served by NG-RAN

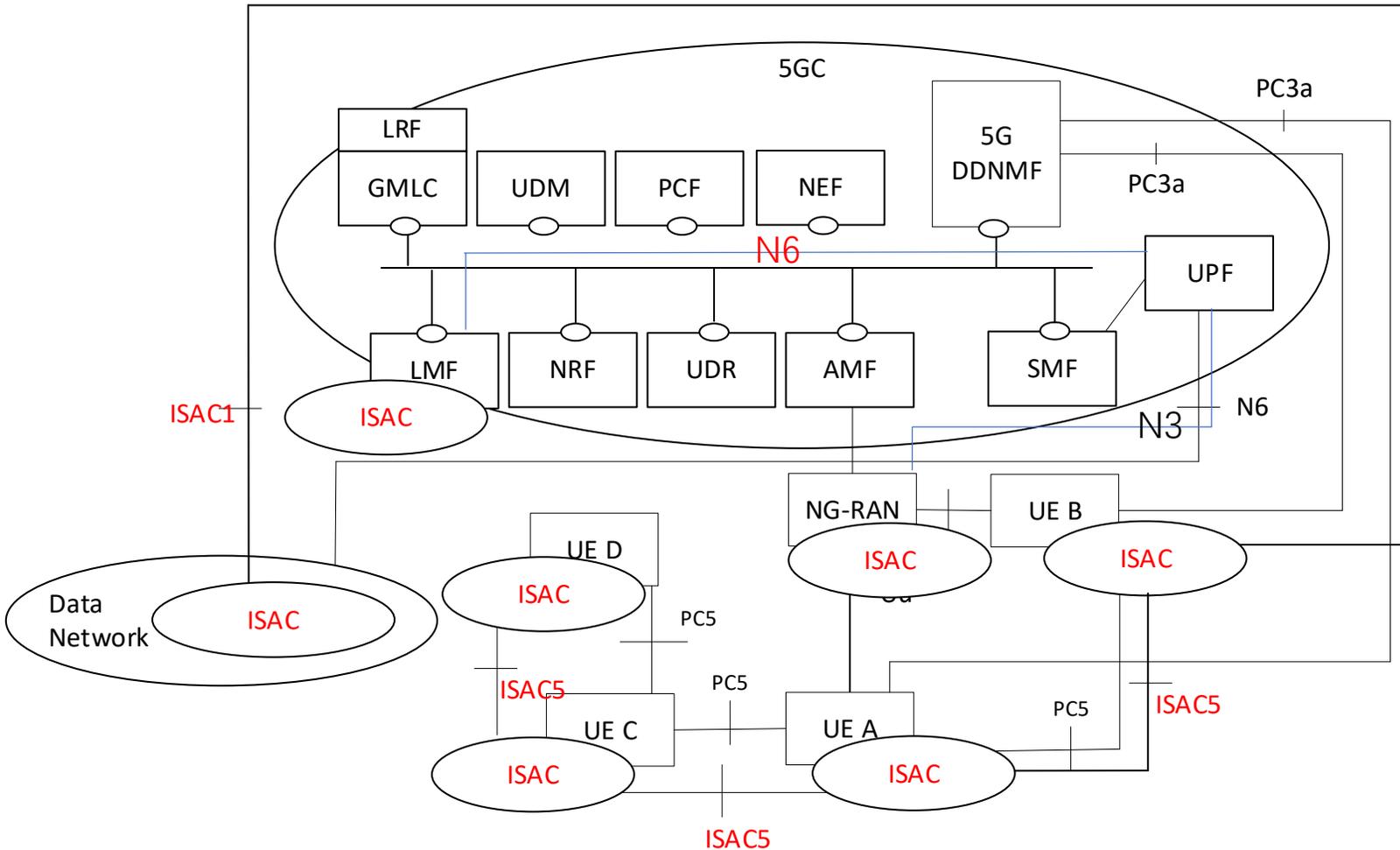


# 5GC Architecture Option 1: new NF and new reference point



- Sensing Function (SF)
  - transmitter/receiver selection
  - transmitter/receiver coordination
  - data processing
  - result exposure
- Nx reference point
  - Interface between UPF and SF
  - If sensing data is collected over UP, a PDU session may be established between UE and SF (Uu+N3+Nx) or between gNB and SF (N3+Nx) based on the adopted sensing option

# 5GC Architecture Option 2: reusing eLCS/Ranging\_SL architecture



- LMF is enhanced to support:
  - ▣ transmitter/receiver selection
  - ▣ transmitter/receiver coordination
  - ▣ data processing
  - ▣ result exposure
- N6 is reused for sensing data collection over UP
  - ▣ a PDU session established between UE and LMF (Uu+N3+N6) (existing solution)
  - ▣ a PDU session established between gNB and LMF (N3+N6) (new enhancements)
- LMF-UE interaction: enhance LPP or define similar protocol to support ISAC (to be developed by RAN WGs)
- LMF-gNB interaction: enhance NRPPa or define similar protocol to support ISAC (to be developed by RAN WGs)
- ISAC5 is used for communication between UE when acting as sensing transmitter/sensing receiver and data collection when sensing data is processed at UE

# Potential SA2 objectives for the R19 study

Architecture enhancement to support Integrated Sensing and Communication for an target object (and its environment) with or without UE on board over licensed or unlicensed spectrum for commercial, V2X, public safety and emergency services use cases:

- Sensing Transmitter/ Sensing Receiver registration and management
- Service authorization and policy/parameter provisioning for a UE or a gNB
- Sensing service operation
  - ▣ Sensing Transmitter/Sensing Receiver discovery and selection
  - ▣ Coordination between Sensing transmitter(s) and Sensing receiver(s)
  - ▣ Data (3GPP sensing data and/or non-3GPP sensing data) collection and transmission by the gNB or the UE or both
  - ▣ Data (3GPP sensing data and/or non-3GPP sensing data) processing
- Sensing service invocation and exposure to the 3rd party application and to the UE
- QoS mechanism and QoS handling
- Sensing service continuity
- Power saving
- Charging
- Security

# AI enabled 5G System

# AI enabled 5G System - Motivations (RAN1)

- Study on Artificial Intelligence (AI)/Machine Learning (ML) for NR air interface (RP-221348) has started to study the AI framework to enable performance improvement by using AI models in UE/NG-RAN in order to support following scenarios, e.g.

- AI based CSI
- AI based beam management
- AI based positioning

- RAN1 has identified 6 cases in the table,

- Model distribution
- Model storage location
  - Out of 3GPP network
  - 3GPP network (e.g., NWDAF, OAM, etc.)
- Training location
  - UE side/Neutral side/ NW-side (e.g., NWDAF, OAM, etc.)

Case	Model distribution (delivery/transfer)	Model storage location	Training location
y	model delivery (if needed) over-the-top	Outside 3gpp Network	UE-side / NW-side / neutral site
z1	model transfer in proprietary format	3GPP Network	UE-side / neutral site
z2	model transfer in proprietary format	3GPP Network	NW-side
z3	model transfer in open format	3GPP Network	UE-side / neutral site
z4	model transfer in open format of a known model structure at UE	3GPP Network	NW-side
z5	model transfer in open format of an unknown model structure at UE	3GPP Network	NW-side

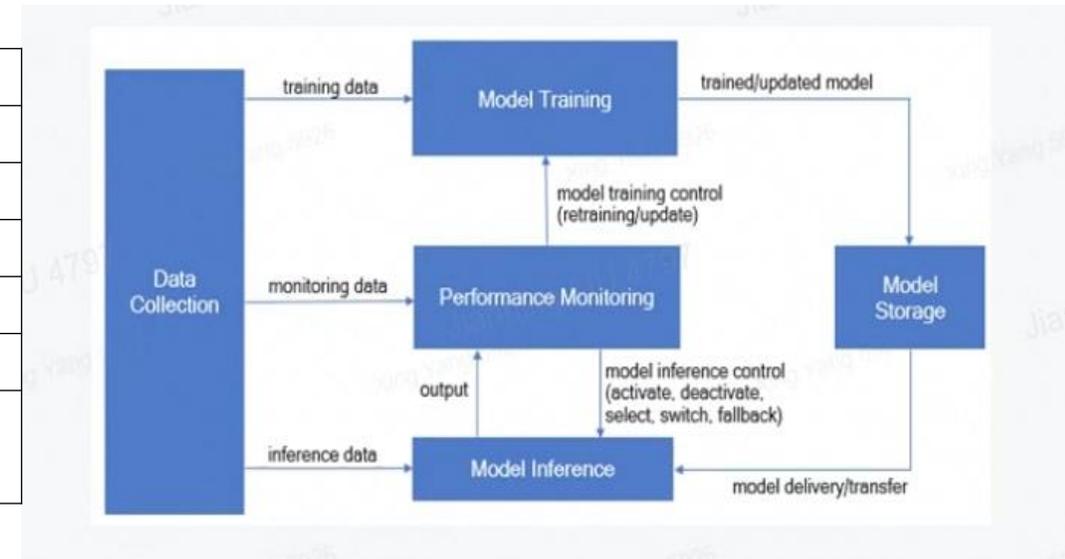
- **Gaps:** currently SA2 doesn't support the RAN use cases above, 5GS architecture needs to be enhanced to support:

- Lifecycle management (LCM) for AI models
- AI model storage, AI model training, AI model distribution (e.g., to UE/NG-RAN/5GC NF(s))
- Performance monitoring, Data collection

# AI enabled 5G System - Motivations (RAN2)

- For the AI Model distribution, RAN2 has studied different solutions in the table, from gNB to UE, CN/LMF to UE, Server (e.g., OAM, OTT) to UE, including Control Plane and User Plane solutions.
- RAN2 has concluded that the general AI/ML framework consist of, (i) Data Collection, (ii) Model Training, (iii) Model Management, (iv) Model Inference, and (v) Model Storage.

Solution 1a: gNB can transfer/deliver AI/ML model(s) to UE via RRC signalling.
Solution 2a: CN (except LMF) can transfer/deliver AI/ML model(s) to UE via NAS signalling.
Solution 3a: LMF can transfer/deliver AI/ML model(s) to UE via LPP signalling.
Solution 1b: gNB can transfer/deliver AI/ML model(s) to UE via UP data.
Solution 2b: CN (except LMF) can transfer/deliver AI/ML model(s) to UE via UP data.
Solution 3b: LMF can transfer/deliver AI/ML model(s) to UE via UP data.
Solution 4: Server (e.g. OAM, OTT) can transfer/delivery AI/ML model(s) to UE (e.g. transparent to 3GPP).



- **Gaps:**

- Based on the general AI/ML framework, current 5GS architecture cannot support the AI/ML framework. SA2 needs to study how to distribute these entities (i.e. Data Collection, Model Training, Model management, Model Inference and Model storage) to 5GS architecture.

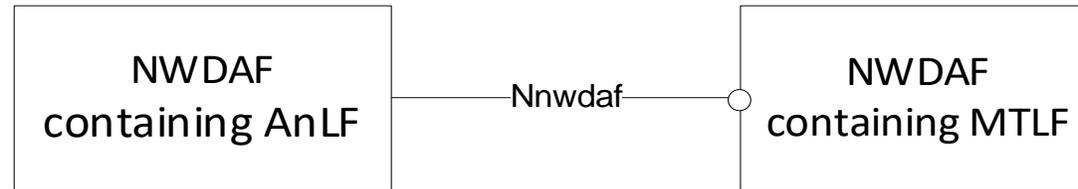
# AI enabled 5G System - Motivations (RAN3)



- Artificial Intelligence (AI)/Machine Learning (ML) for NG-RAN (RP-220635) has started to specify data collection enhancements and signaling support within existing NG-RAN interfaces and architecture for the following scenarios, e.g.
  - ❑ AI/ML-based Network Energy Saving
  - ❑ AI/ML-based Load Balancing
  - ❑ AI/ML-based Mobility Optimization
- For the deployments of RAN intelligence, following scenarios may be supported in R18:
  - ❑ AI/ML Model Training is located in the OAM and AI/ML Model Inference is located in the gNB.
  - ❑ AI/ML Model Training and AI/ML Model Inference are both located in the gNB.
- **Gaps:**
  - ❑ Existing RAN3 mechanism doesn't support multi-vendor interoperability and collaboration with 5GC AI/ML enabled functions, which limits the scenarios and performance of AI/ML for NG-RAN.
  - ❑ New uses cases such as AI/ML based QoE optimization, AI/ML based network slicing management may need collaboration with 5GC in data collection, model training and model transfer and management.

# AI enabled 5G System - Motivations (SA2)

- Enablers for Network Automation for 5G (FS\_eNA\_Ph2/3), which provides/consumes the AI models within NWDAF, and sharing the AI models between NWDAF(s).
  - ❑ Analytics logical function (AnLF): performs inference, derives analytics information and exposes analytics.
  - ❑ Model Training logical function (MTLF): trains Machine Learning (ML) models and exposes new training services.



- Observation: currently the AI models is not supported to be shared by other 5GC NFs. It is benefit for NWDAF to share the AI models with other NFs, e.g., NG-RAN, 5GC NF(s) or UE.

# Potential architecture enhancement (option 1)

- Enablers Option1 (case Z1-Z5)

- AI model storage location: Network

*e.g., NWDAF/LMF or new NF*

- AI model training location: UE, and (R)AN

- AI model inference: UE, RAN

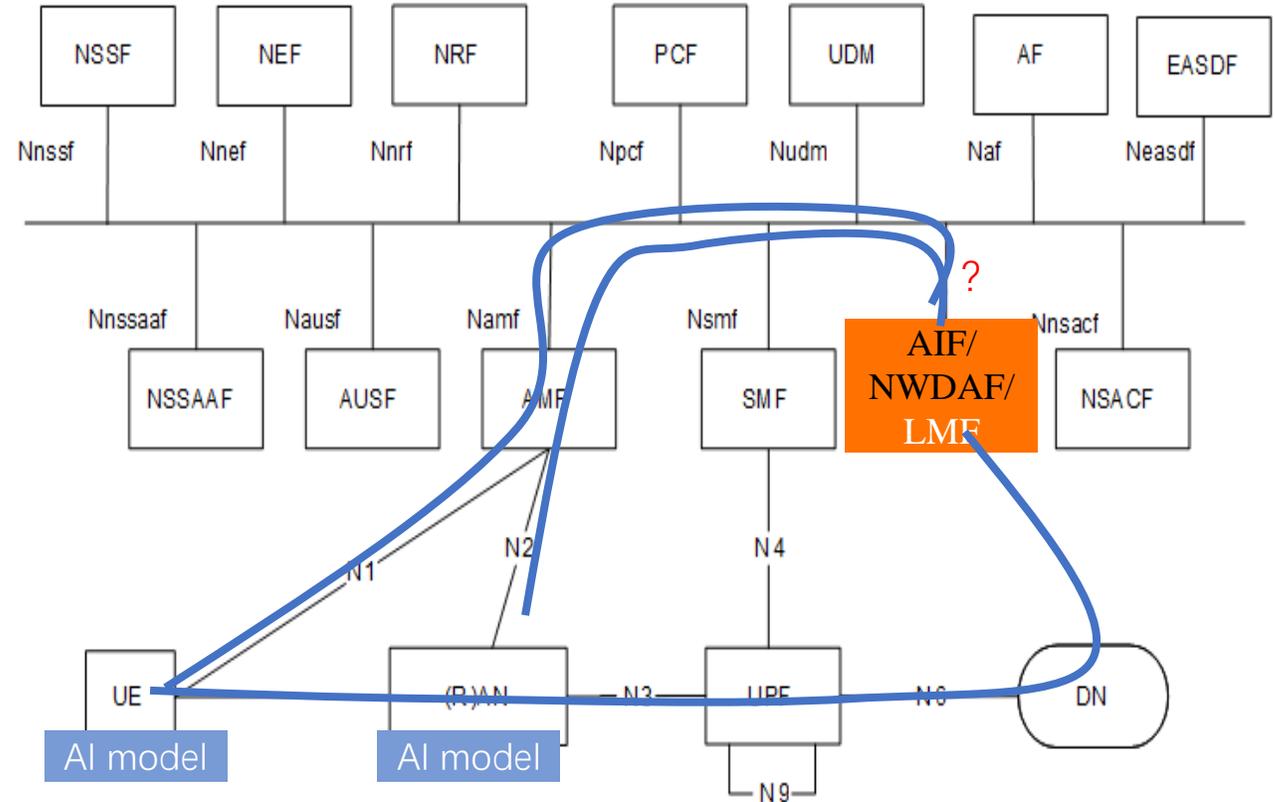
- AI model distribution:

- From NWDAF/new NF/LMF to (R)AN

- From NWDAF/new NF/LMF to UE

- Control plane

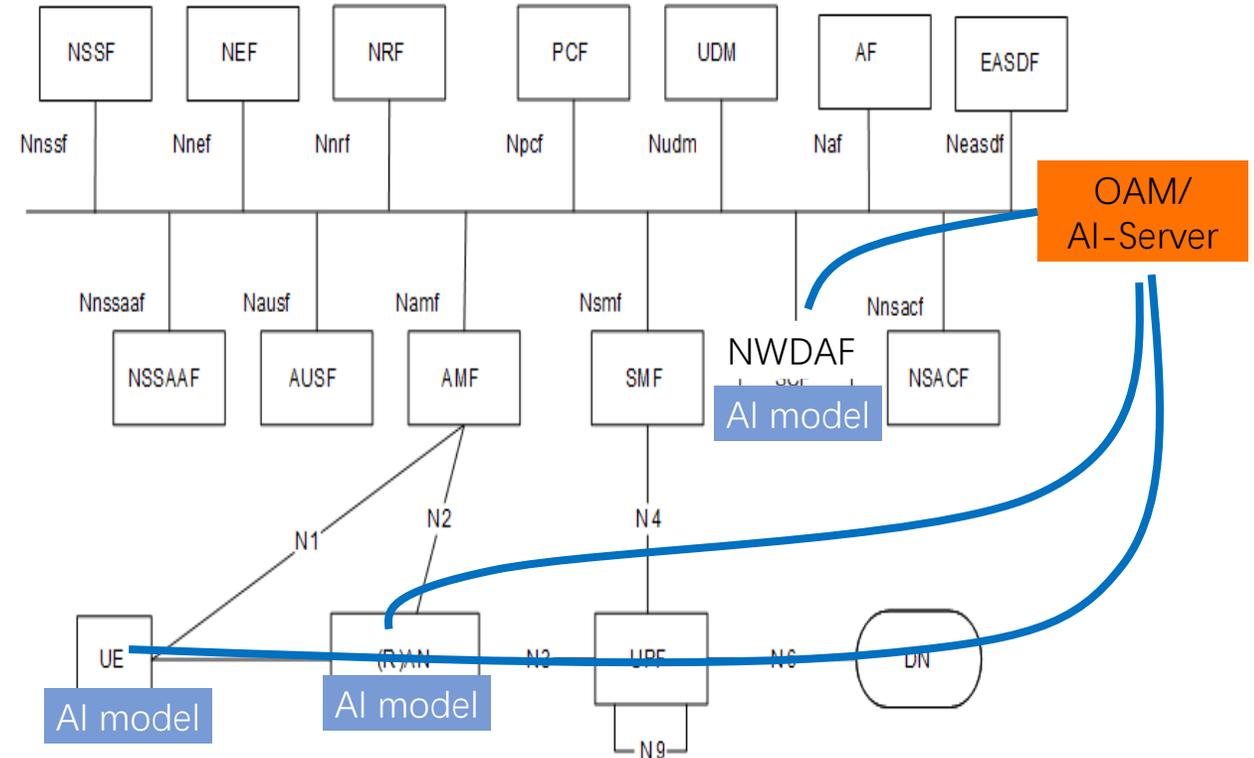
- User plane



# Potential architecture enhancement (option 2)

- Option2 (case Y)

- AI model storage location: outside 3GPP  
e.g., OAM, or AI-Server
- AI model training location: UE, NWDAF, OAM
- AI model inference: UE, RAN
- AI model distribution:
  - From OAM to (R)AN
  - From OAM to NWDAF
  - From AI-Server to UE via user plane



# AI enabled 5G System - Potential SA2 Objectives



This SID is aiming to introduce AI technologies to 5G System for the enhancement of radio resources management, positioning/location, etc.

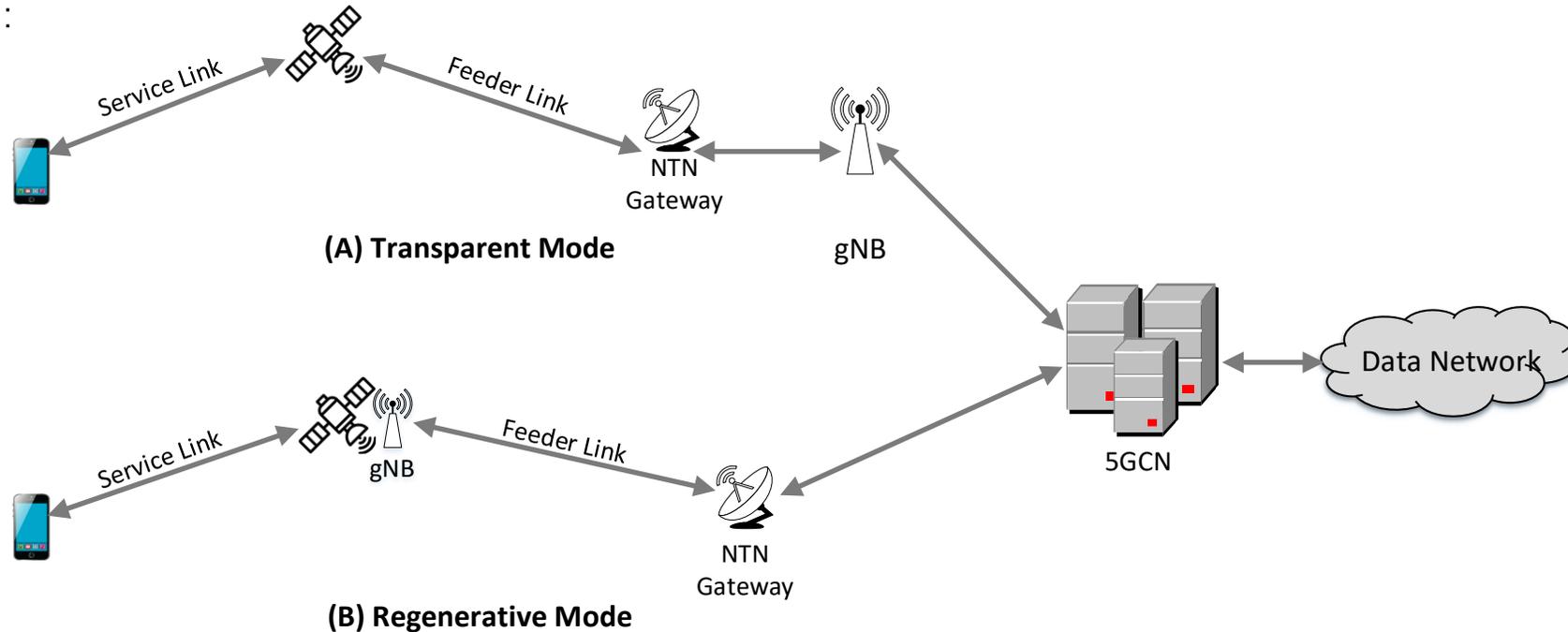
The potential Objective includes:

- Identify the architecture impacts based on the use cases provided from RAN (i.e. Y, Z1-Z5)
- Study on how to distribute the entities of AI framework in RAN into 5G architecture, including Data Collection, Model training, performance monitoring, Model interference, Model storage, etc. How to apply the AI enabled 5G architecture to support the scenarios identified by RAN [e.g., AI based CSI/beam management/position]
- The management of AI models by the NG-RAN, 5GC NF or UE, including,
  - ❑ AI models registrations/deregistration
  - ❑ AI models creation/updates/removal
  - ❑ AI storage/AI models training/inference
  - ❑ AI models distribution to the required NG-RAN, 5GC NF or UE, e.g. over user plane or control plane
  - ❑ Data collection from UE/NG-RAN/5GC NF(s)/application server for AI models training.
- QoS mechanism enhancement to support, e.g., the delivery of AI models.
- Security

# **Integration of satellite components in the 5G architecture Phase III**

# Motivations

- Satellite access has gained more and more consensus which is playing a key part in extending cellular 5G networks to air, sea and other remote areas not covered by terrestrial cell networks.
- Transparent mode (full transparent to NR protocols) and Regenerative mode (On-board part or full NG-RAN functionality) :



- ❑ Such two modes mentioned in TR 23.737(SA2 R-17 5GSAT\_ARCH), but only transparent mode is targeted until R-18
- ❑ Most use cases and requirements described in TR22.865 (SA1 R-19 FS\_5GSAT\_Ph3) are based on Regenerative mode
- ❑ Supporting regenerative mode can further enrich satellite access deployment. In some cases, it can reduce latency and improve service experience, compared with transparent mode (e.g. on-board NR+UPF)

# Potential issue & Identified Gaps (1)

- Feeder link discontinuous connection

- Descriptions

- UE network connection may interrupt due to satellite coverage without active feeder link connection to the ground station.
      - UE locates in the areas with few ground station, e.g. deep-sea maritime areas
    - Enable RAN on-board with:
      - Store and forward operation is proposed to support delay-tolerant/non-real-time services during discontinuous feeder link.
      - Support real time services between UEs using the same satellite access or between UE and application server on board as well without going through the terrestrial network

- Gaps

- Support of store and forward operation for delay-tolerant service when feeder link is unavailable
    - Support of local data switch between UEs using the same satellite access
    - Support of time sensitive service by local communication between UE and application server on board

# Potential issue & Identified Gaps (2)

- Handover due to RAN node mobility for Regenerative mode
  - Descriptions:
    - Embarking RAN on-board NGSO satellites implies frequent handovers of RAN nodes for any given 5GC.
    - A large number of UE under the same coverage will be simultaneously handed over from one RAN node to another one, which may cause overload in RAN and CN.
  - Gaps:
    - Conditions to trigger handover from a RAN node to another RAN node
    - Interface (X2/N2) and Functionality(RAN/5GC) enhancements to support RAN node mobility
    - Overload control due to the RAN node mobility

# Potential issue & Identified Gaps (3)

- SCAI provision due to discontinuous coverage

- Descriptions:

- In Rel-18, it was decided this release will not work on the standardization of Satellite Coverage Availability Information(SCAI) and can be handled in the future release.
    - Without the standard SCAI, it would be difficult to derive accurate out of coverage period for a UE by the UE and or the network.

- Gaps:

- Is the SCAI provided to the UE consistence with the one provided to the AMF?
    - Support of satellite coverage availability information standardization provided to the UE/AMF

NOTE: whether this objective is included or not will based on the progress of 5GSAT\_Ph2 in SA2 R18.

# Potential SA2 Objectives for the R19 study

- Discontinuous Feeder link for regenerative mode
  - Support of store and forward operation for delay-tolerant service when feeder link is unavailable
  - Support of local data switch between UEs using the same satellite access
  - Support of time sensitive service by local communication between UE and application server on board
- Handover optimization for regenerative mode
  - Conditions to trigger handover enhancement
  - Interface(X2/N2) and Functionality (RAN/5GC) enhancements to support RAN node mobility
  - Overload control due to the RAN node mobility
- SCAI provision for discontinuous coverage
  - Satellite coverage availability information standardization provided to the UE/AMF

**NOTE: whether this objective is included or not will be based on the progress of 5GSAT\_Ph2 in SA2 R18.**

# ANNEX: Xiaomi Interested R19 Study



- Ambient IoT
- DualSteer
- XRM Phase II



# Ambient IoT

# Ambient IoT - Overview (TR 22.840)

## Definition

An ambient power-enabled Internet of Things device is an IoT device powered by energy harvesting, being either battery-less or with limited energy storage capability (e.g., using a capacitor).

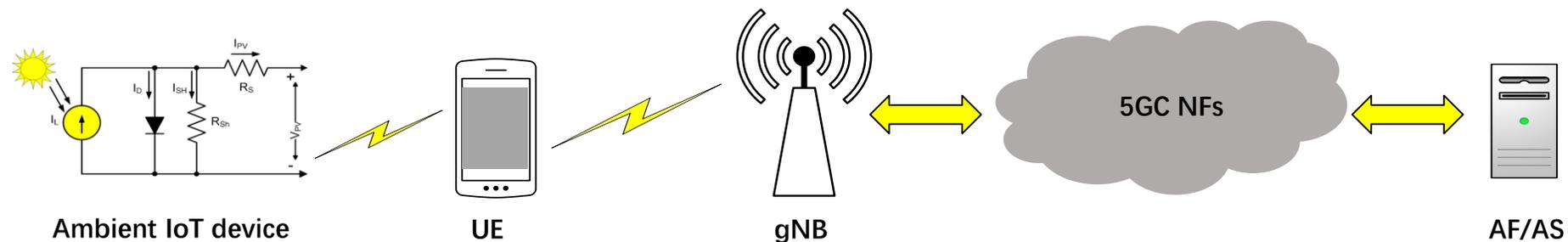
## GAP with 5G LPWA

- extreme environmental conditions e.g., high pressure, extremely high/low temperature, humid environment;
- where a device driven by a conventional battery is not applicable;
- ultra-low complexity, very small device size, longer life cycle;

## Characteristics

### Ambient IoT:

- Low complexity
- small size
- lower capabilities
- lower power consumption
- long lifecycle ( >10 years)
- maintenance free



UE as the ambient reader function preferred by Xiaomi

# Ambient IoT - Motivations (SA1)

- SA1 Ambient power-enabled Internet of Things (SP-220085) studies the Ambient IoT in SA1 with the objectives include:

- ❑ Study use cases of Ambient IoT and identify potential service requirements
- ❑ Study traffic scenarios, device constraints (e.g., power consumption) and identify potential performance requirements and KPIs
- ❑ Gap analysis between the identified requirements for ambient power-enabled Internet of Things and what is already defined by existing 3GPP requirements.

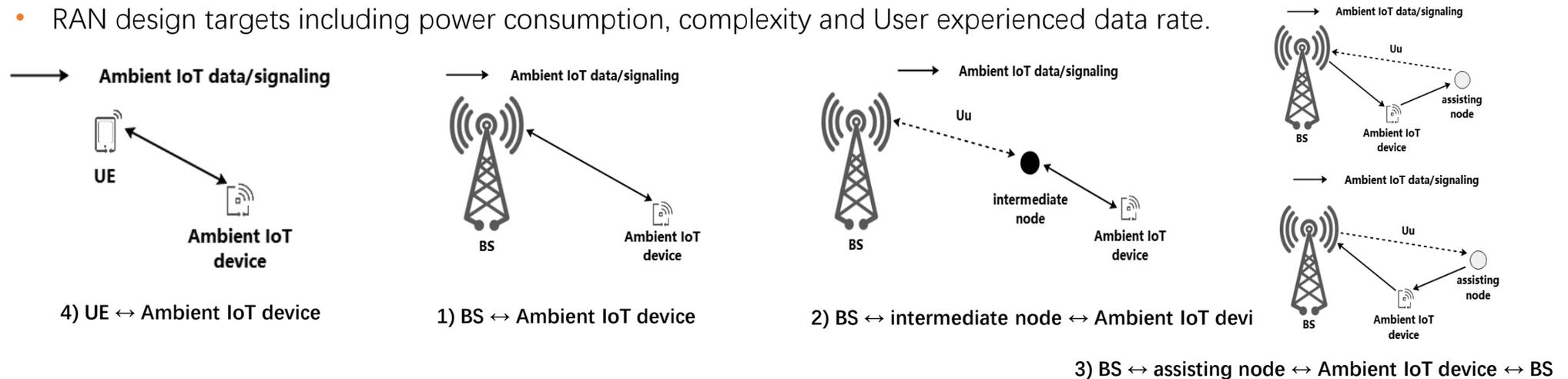
## The potential service requirements:

- Security aspects, e.g., authentication and authorization.
- Network selection, access control, connection, mobility and identification management
- Charging (e.g., per data volume, per message)
- Aspects related to stakeholder models (e.g., involving interactions in PLMNs, NPNs or other parties)
- Positioning
- Aspects on device life cycle management related to 3GPP system.

- 30 use cases and 3 traffic scenarios is identified in the TR 22.840 of SA1.
- Note 1: Specifics of how the device performs energy harvesting are not in the scope of the study.
- Gaps:
  - ❑ Current 5GS cannot support the communication with the Ambient IoT device.
  - ❑ SA2 needs to study how to support the energy efficient communicate with the Ambient IoT devices to fulfil the service requirements (e.g. network selection, access control, mobility, lifecycle management, the information collection and provision) of the different use case and traffic scenarios as identified by SA1.

# Ambient IoT - Motivations (RAN)

- Study on Ambient IoT in RAN (TR 38.348) has stated to study the Ambient IoT with progress include:
  - use cases with groups on the basis of the deployment environment or functionality/application;
  - 5 deployment scenarios and 4 topologies for connectivity topologies is identified;
  - Device categorization based on the storage capacity:
    - Device A: No energy storage, no independent signal generation/amplification, i.e. backscattering transmission.
    - Device B: Has energy storage, no independent signal generation, i.e. backscattering transmission. Use of stored energy can include amplification for reflected signals.
    - Device C: Has energy storage, has independent signal generation, i.e., active RF components for transmission.
    - RAN design targets including power consumption, complexity and User experienced data rate.



- Gaps: SA2 needs to study how to support the energy efficient communicate with different type Ambient IoT devices during the different connectivity topologies to fulfil the service requirements.

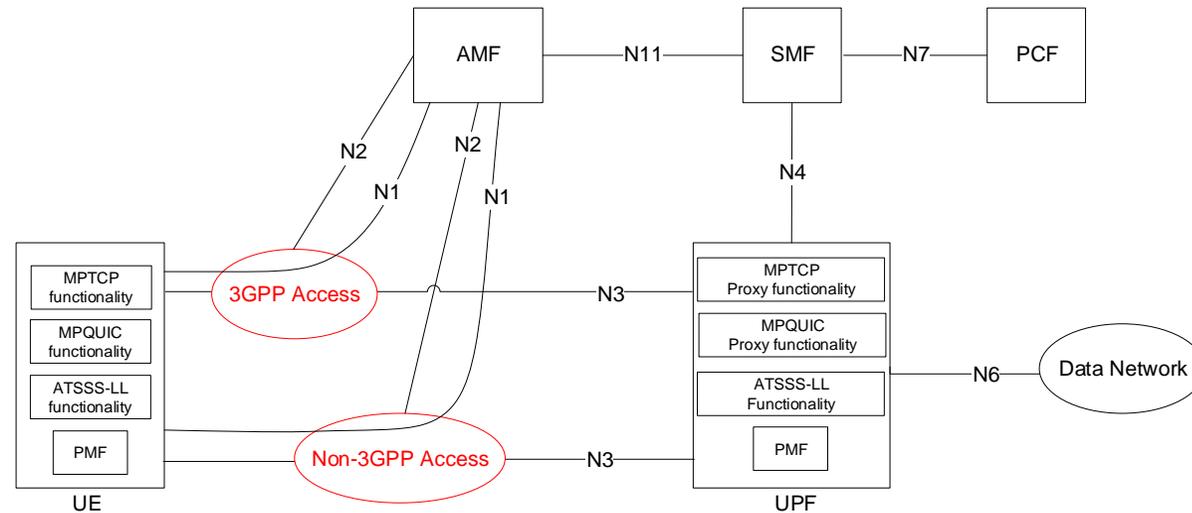
# Ambient IoT - Potential SA2 Objectives

- Support the energy efficient communication with different type Ambient IoT device to fulfilled the service requirements of the use cases on the basis of deployment environment or application.
  - ❑ UE as the ambient reader function is prefer.
  - ❑ Potential objectives including:
    - Identify the architecture impacts based on the use cases provided by SA1 and RAN to support the energy efficient communication;
    - Study the access control and mobility management for the Ambient IoT supporting;
    - Study the QoS mechanism for the Ambient IoT supporting;
    - Study the information collection and exposure to the AF (identified by SA1 an RAN);
    - Study the life cycle management of the Ambient IoT device;
    - Study the security and privacy with light-weight;
    - Charging. e.g. collection of charging information based on charging policies for Ambient-IoT device;

DualSteer

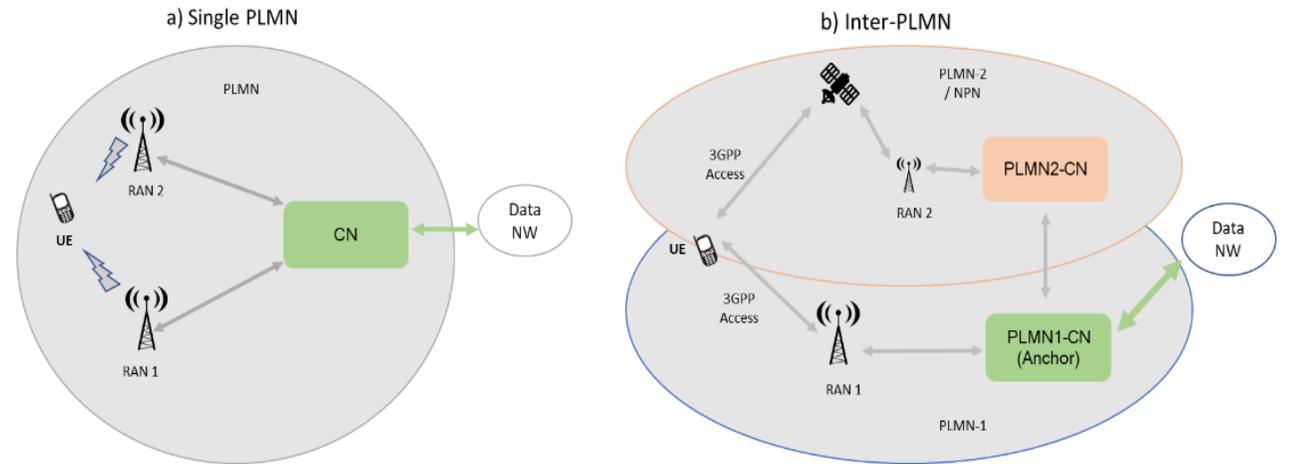
# Motivations

- ATSSS enables data traffic between UE and UPF simultaneously over one 3GPP access path and over another non-3GPP access path.
- By leveraging the data traffic over multiple paths, the 5G system can provide services with higher data rate, better service continuity which can improve user experience.
- In some circumstance, there is a lack of non-3GPP access or insufficient network coverage. Instead, more than one 3GPP access is deployed which can provide double coverage in such areas.



## Concept & Scenarios

- **DualSteer**: is to study further enhance of ATSSS feature which enables data traffic across two 3GPP access networks, where only one single subscription is assumed.
- **Typical scenario**: two 3GPP access belongs to a) one single PLMN, b) two PLMNs, c) PLMN+NPN
- Data traffic is anchored in the HPLMN(in case of different PLMNs).
- Data routing across two 3GPP accesses can be based on:
  - connectivity conditions on both access networks
  - service preference,
  - other conditions or restrictions, e.g. location, time



## Intra-PLMN and Inter-PLMN scenarios

## SA1 Status

- SID: SP-220445 TR latest version: 22.841 v1.0.0
- Percentage completion: 70% (SA1#101)
- Target completion date: SA#100 (06/2023)
- Potential requirements derived from use cases do not foresee RAN impacts and assume UE support of proper capabilities (e.g., dual radio)

# Potential Objectives for the R19 Study

- Enhancement of steering, splitting, switching of user data across two 3GPP networks
  - ❑ Support of dual 3GPP access with one single PLMN, two different PLMNs or PLMN+NPN
  - ❑ Support of dual 3GPP access with same or different RATs
  - ❑ Potential enhancements on:
    - PLMN selection
    - Registration to one PLMN via different 3GPP access or registers to two PLMNs using the same credential (i.e. assuming one single PLMN subscription)
    - MA PDU session establishment using two 3GPP access
    - Traffic routing policy
    - Charging

# XRM Phase II

# XRM phase II - Motivations (SA1)

- SA1 Metaverse (SP-220353, TR 22.856) is studying XR-based services (28 use cases identified) with the objectives:
  - ❑ Investigate specific use cases and service requirements for 5GS support of enhanced XR-based services as well as potentially other functionality, to offer shared and interactive user experience of local content and services, accessed either by users in the proximity or remotely.
  - ❑ The interactive XR media shared among multiple users in a single location.
  - ❑ Identification of users and other digital representations of entities interacting within the Metaverse service.
  - ❑ Acquisition, use and exposure of local (physical and digital) information to enable Metaverse services.
  - ❑ Privacy, charging, public safety and security requirements.
- SA1 XRMobility (SP-230233) is studying XR-based services with the objectives:
  - ❑ the 5G system shall support the service continuity for XR services and support the connectivity for XR services under high UE mobility.
- Gaps:
  - ❑ Not support the service continuity for XR services and the connectivity for XR services under high UE mobility.
  - ❑ Not support the synchronize multiple SDFs from multiple UEs associated with one user, and different users at different locations.
  - ❑ Not support the QoS enhancement/coordination for the UE to UE interaction, e.g. latency of the UE to UE;
  - ❑ Not support the spatial anchors interaction, e.g. establish an association between a physical location and service information, exposure of spatial anchors to authorized third parties, and of service information associated with spatial anchors.

# XRM phase II - Motivations (RAN)

- RAN XR (eXtended Reality) enhancements for NR (TR 38.835) studied the enhancement for the XR services. Conclusions are recommended as follows,
  - ❑ For XR Awareness:
    - Provisioning by CN of semi-static information per QoS flow (e.g. PDU set QoS parameters), dynamic information per PDU set (PDU Set information and Identification) and End of Data Burst indication;
    - Identifying by UE of PDU Sets, Data bursts and PSI;
    - Provisioning by UE of XR traffic assistance information e.g. periodicity, UL traffic arrival information (FFS).
  - ❑ For Power Saving, DRX support of XR frame rates corresponding to non-integer periodicities.
  - ❑ For Capacity Enhancements:
    - Multiple CG PUSCH transmission occasions in a period of a single CG PUSCH configuration;
    - Dynamic indication of unused CG PUSCH occasion(s) based on UCI by the UE;
    - BSR enhancements including at least new BS Table(s);
    - Delay reporting of buffered data in uplink;
    - Discard operation of PDU Sets.
- Gaps:
  - ❑ Continue study the XR awareness for the UL, e.g. PDU set based QoS handling of the UL.
  - ❑ Continue study the power saving, and trade off between the power consumption with the QoE.
  - ❑ Not support the PDU set based QoS handling cross the QoS flows, e.g. discard and coordination of the PDU set cross the QoS flows.

# XRM phase II - Motivations (SA2 & SA4)

- SA2 XRM (TR 23.700-60) studied the architecture aspects related to better support advanced media services, e.g., HDRLL services, AR/VR/XR services, and tactile/multi-modality communication services.
  - ❑ The conclusions of all 9 KIs are recommended for normative work(TS 23.501/502/503) described in clause 5.37 of TS 23.501 as follows,
    - support QoS policy control for multi-modal traffic, see clause 5.37.2.
    - support network information exposure which can be based on ECN markings for L4S, see clause 5.37.3 or 5GS exposure API, see clause 5.37.4.
    - support PDU Set based QoS handling including PDU Set identification and marking, see clause 5.37.5.
    - ensure that the UL and DL packets together meet the requested RT delay and also update the delay for UL and DL considering QoS monitoring results, see clause 5.37.6.
    - perform per-flow PDV monitoring and policy control according to AF provided requirements, see clause 5.37.7.
    - provide traffic assistance information to the NG-RAN to enable Connected mode DRX power saving, see clause 5.37.8.
- SA4 5G Real-time Media Transport Protocol Configurations (TS 26.522) focuses on RTP over UDP
  - ❑ Optimizing the use of RTP for uni and bi-directional transport of real-time immersive media and associated metadata.
  - ❑ On progress the RTP Header Extension for PDU Set Marking.
- Gaps:
  - ❑ Not support the inter PDU sets dependency, inter SDFs coordination for PDU set based QoS handling.
  - ❑ Need to enhance the mobility management for XR, e.g. policy coordination for multi-UEs, NF discovery and reselection.
  - ❑ Power saving, tradeoff of the power consumption and QoE, e.g. for different type device;
  - ❑ The synchronization/coordination between multi-SDFs of the same Multi-modality service, e.g. multi-SDFs of multi-UEs.

# XRM phase II - Potential SA2 Objectives

- This SID of XRM Phase II is aiming to continue the study XRM service supporting considering the requirements identified from SA1, RAN, SA4 and the SA2 Phase I.
- The Potential objectives includes:
  - ❑ Study the PDU Sets based QoS handling enhancement, e.g. UL PDU set handling, inter set dependency in QoS flow, PDU set handling cross QoS flows, PDU set discard optimization, encrypted SDFs supporting;
  - ❑ Study the mobility enhancement, e.g. service continuity for XR services and the connectivity for XR services under high UE mobility;
  - ❑ Study potential enhancements of power management considering the characteristic of media services or the UE on the different scenarios, e.g. localization service, spatial information; tradeoff of the power consumption and QoE, e.g. for different type device;
  - ❑ Study to support the synchronization/coordination between multi-SDFs of the same Multi-modality service, e.g. multi-SDFs of multi-UEs in different location;
  - ❑ QoS enhancement/coordination for the UE to UE interaction, e.g. latency of the UE to UE.



Let everyone in the world  
enjoy a better life  
through innovative technology