

3GPP TSG-RAN Meetings #88

RP-200911

RAN plenary reflector 30th June.– 3rd July. 2020

Agenda item: 9.9

2020/6/22

Motivation for NR sidelink in unlicensed bands

NR sidelink in unlicensed bands (SL-U)

In future some applications among co-located users e.g. XR gaming requires [1]

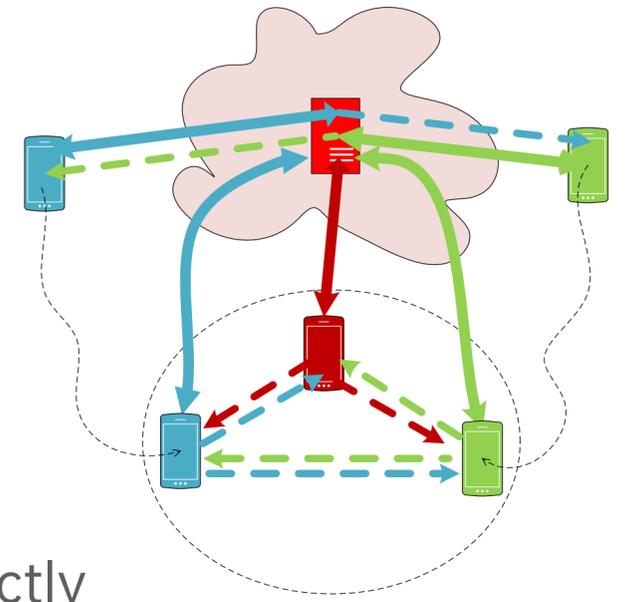
- High throughput around 1Gbps; Low latency less than 10ms; High reliability about 99.99%; Power saving device form e.g. VR glass

Sidelink based on unlicensed spectrum has potential to meet the requirement

- Network controlled mode (Mode 1) operation can help reduce latency down to few ms and improve reliability
- Power saving solution in R17 and maybe also R18 can help reduce power consumption
- CA with licensed band can further boost data rate with better control
- Wider bandwidth e.g. 1GHz in 5GHz band; few GHz in 60GHz
- Specification on 60GHz will be ready upon completion of Rel17

The study of sidelink based on unlicensed spectrum is motivated by:

- Better QoE from user perspective compared to communication through Uu interface indirectly
- Operator control and delivery of service when application needs server verification and authentication
 - ✓ Offloading Uu throughput to PC5
 - ✓ Saving licensed spectrum e.g. FR2 for other cellular coverage or hot spot
- Benefit for other use cases e.g. home network, e-health care etc.

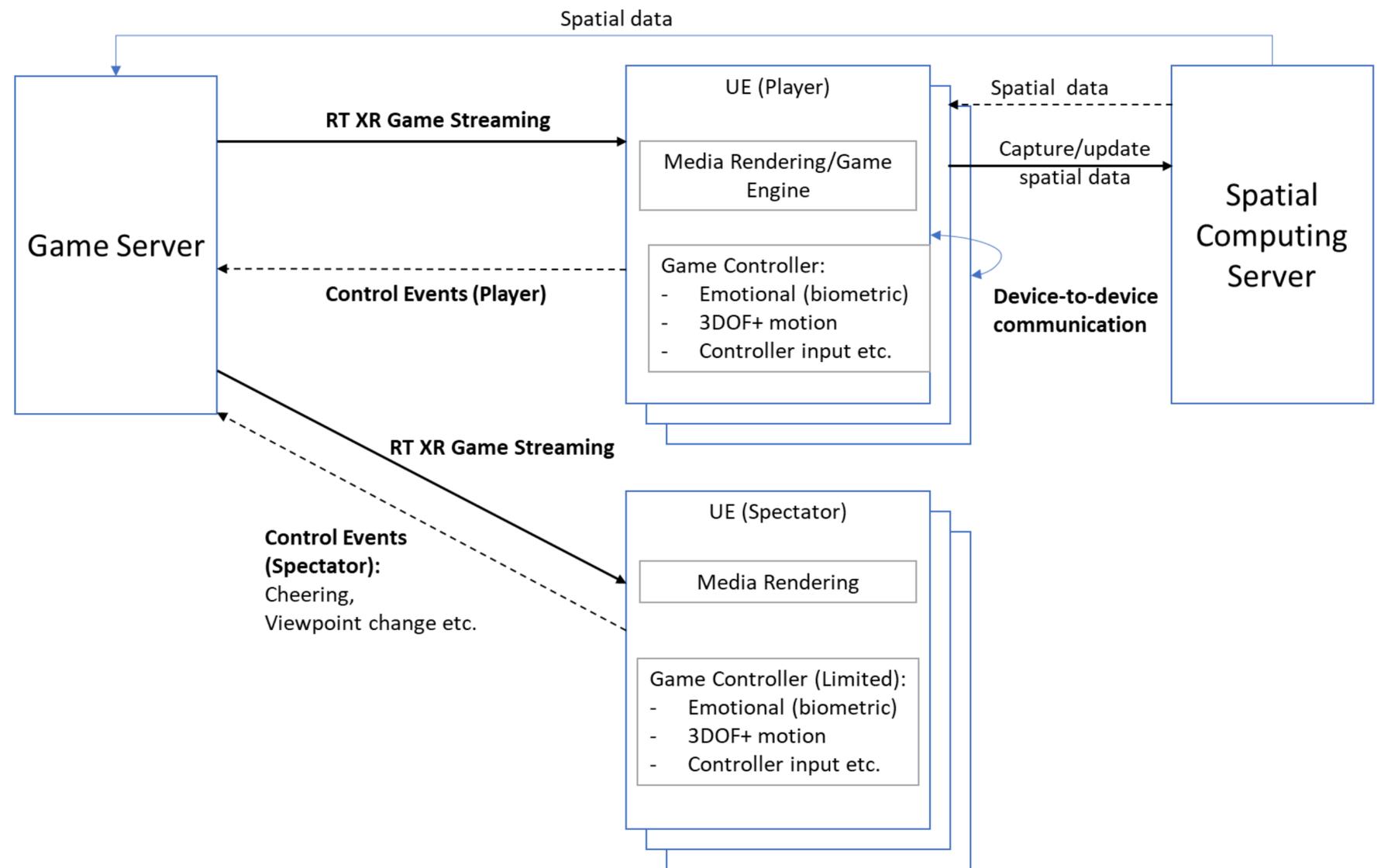


XR gaming

Each player UE receives a stream of the live game from the game server and sends control signals back to the server that influence the game play.

In an extension, the players may be co-located at a gaming party/session using device-to-device or centralized (via gaming server) communication to enhance the user experience due to improved QoS parameters.

More gaming use cases can be found in table 5.1-1 in [1]



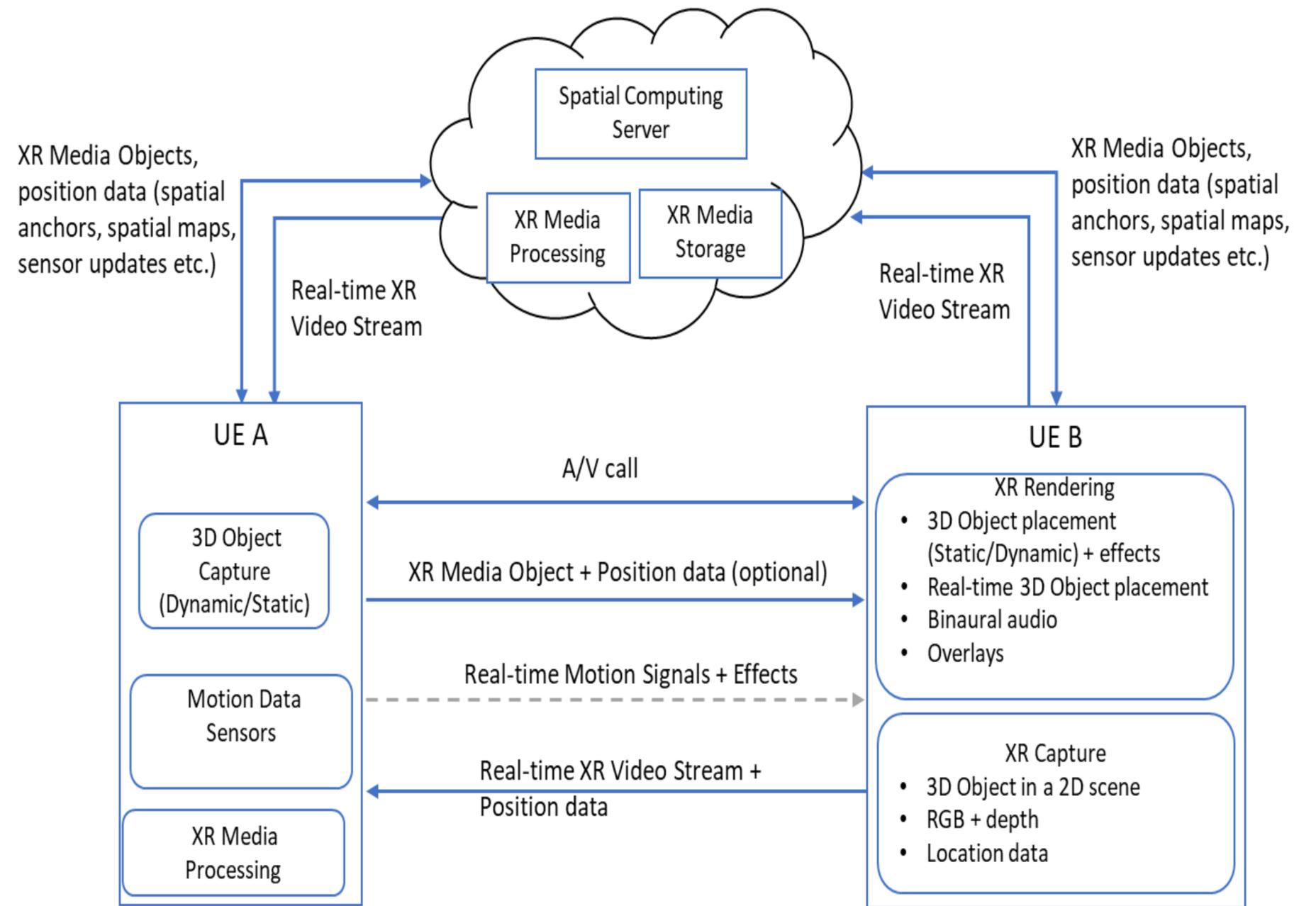
Real-time sharing of XR content

UE B is a device capable of XR rendering, such as AR glasses, or a mobile phone that is sending a real-time video stream of the XR experience to UE A. The XR experience is being captured and rendered by the UE B.

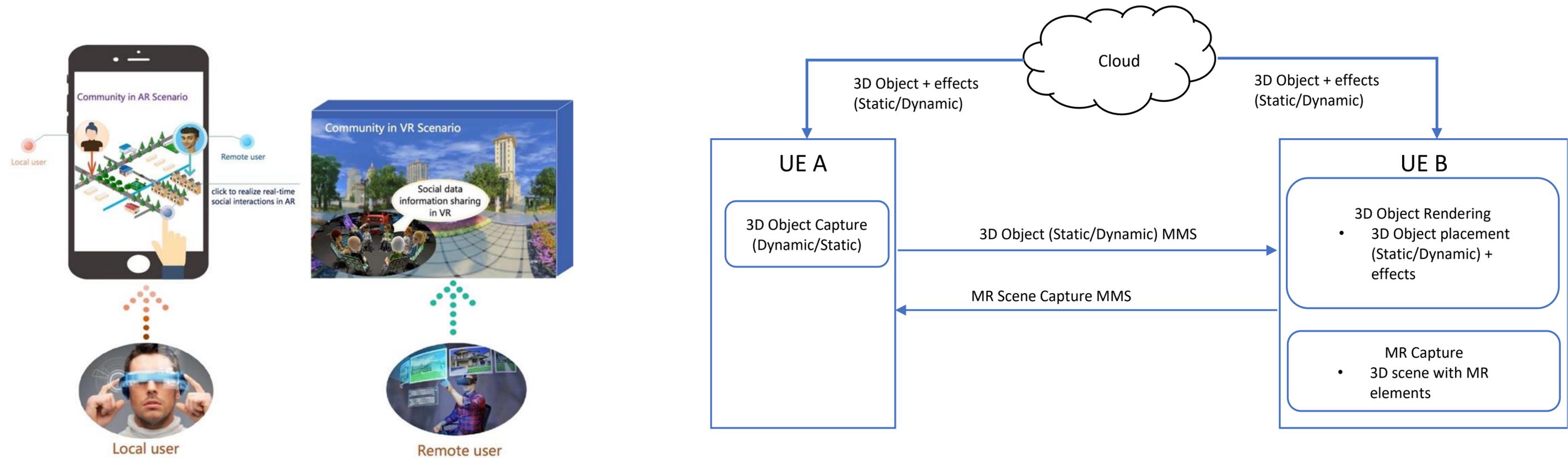
A bidirectional or unidirectional A/V channel may be open between the devices depending on the use case.

UE A also sends a real-time stream of motion signals and effects that influence the rendering of the 3D object model on UE B

More use cases can be found in table 5.1-1 in [1]

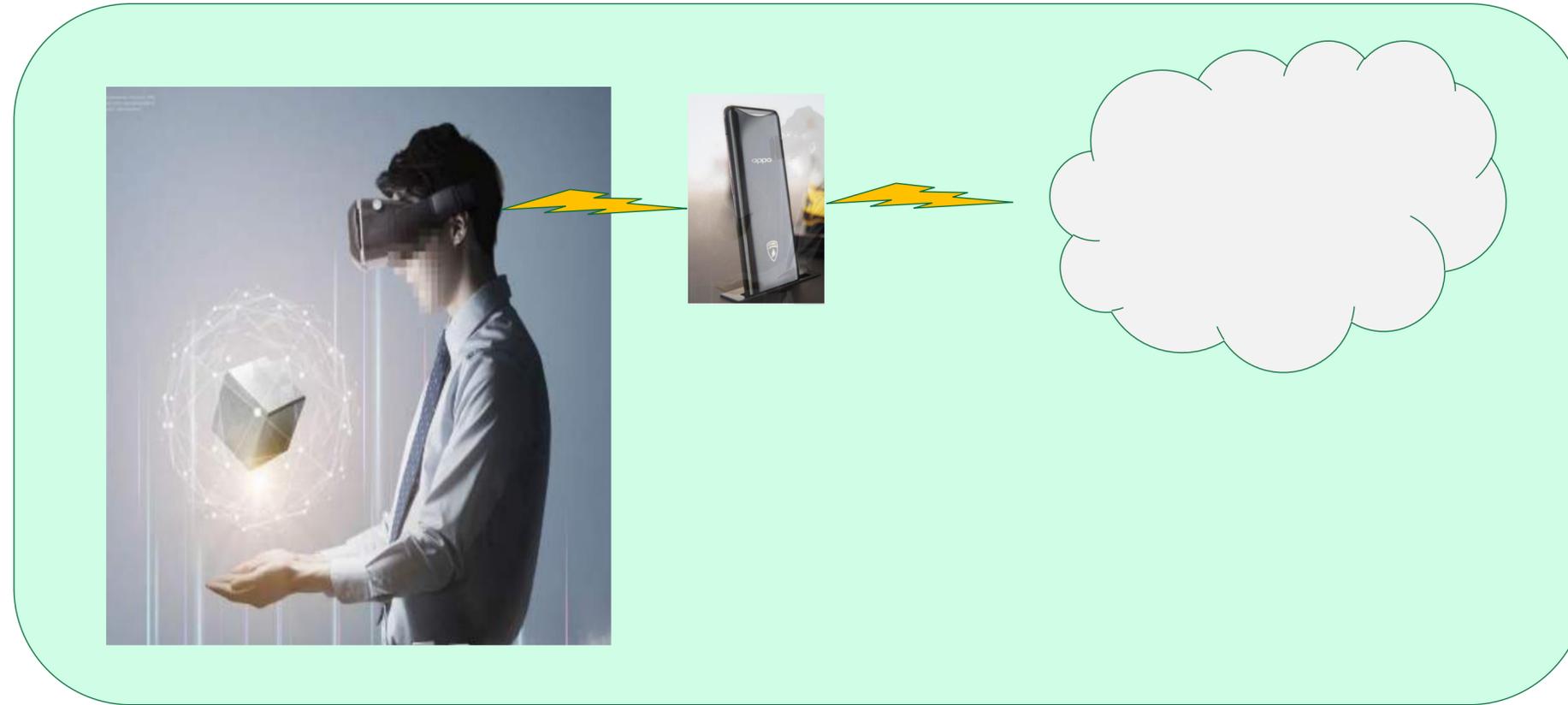


Media sharing



Offline sharing is used for sharing 3D models/objects and 3D MR scenes amongst UEs. In Figure UE A shares a 3D static/dynamic object with UE B. The 3D object can be a stored object downloaded by UE A from the cloud, or captured by the device using for example a depth camera
More use cases can be found in table 5.1-1 in [1]

Wireless tethered connection



AR/VR glass or helmet-mounted etc. need be tethered to a smart phone to get access to cloud Instead of wired connection, a sidelink connection between VR/VR glass or helmet-mounted can improve user experience quite a lot

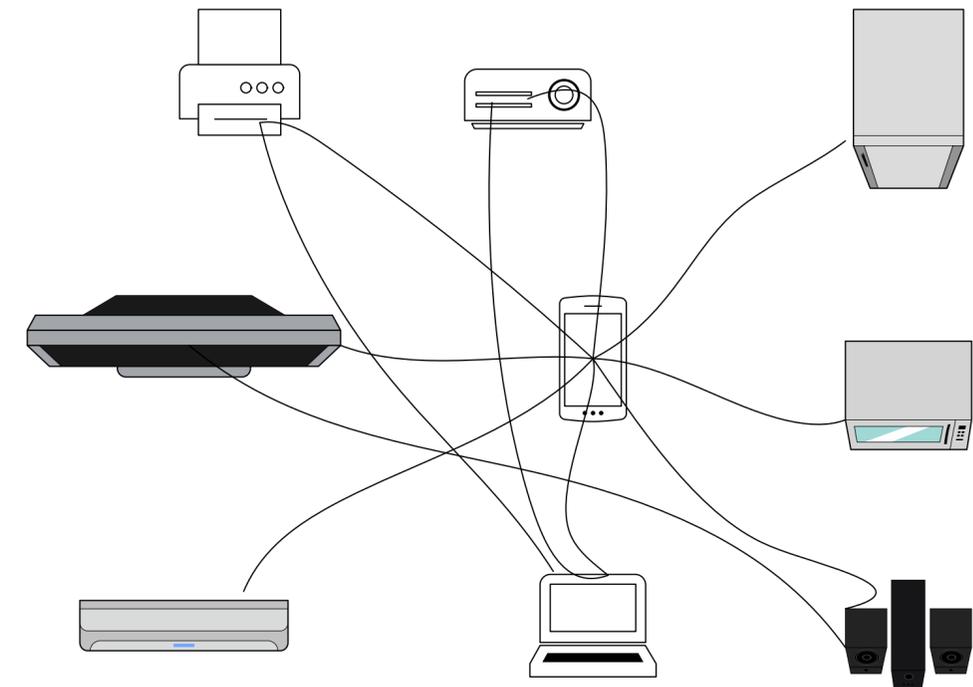
Home network

Home network

- Connections among smart phones , wearable device and intelligent electronics based on unlicensed PC5
- Requirements
 - ✓ Data rate could be up to 500Mbps
 - ✓ Latency could be low to 10ms
 - ✓ Connectivity could be around 20

Pros:

- Power saving for wearable devices. Remote control at home on electronics. Cable-less electronics.



Requirement(s)

Use Cases	Characteristic parameter (KPI)			Influence quantity		
	Max Allowed End-to-end latency	Service bit rate: user-experienced data rate	Reliability	# of UEs	UE Speed	Service Area (note 2)
Gaming or Interactive Data Exchanging (note 3)	10ms (note 4)	0.1-[1] Gbit/s supporting visual content (e.g. VR based or high definition video) with 4K, 8K resolution and up to 120fps content.	99.99% (note 4)	≤ [10]	Stationary or Pedestrian	20 m x 10 m; in one vehicle (up to 120 km/h) and in one train (up to 500 km/h)
Consume VR content via tethered VR headset (note 6)	[5 -10] ms (note 5)	0.1-[10] Gbit/s (note 5)	[99,99%]	-	Stationary or Pedestrian	-

NOTE 2: Length x width (x height).

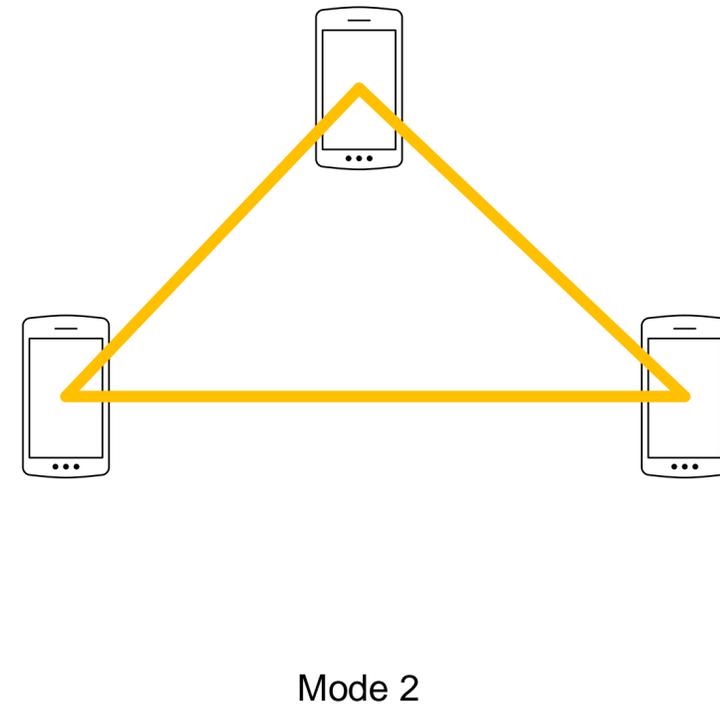
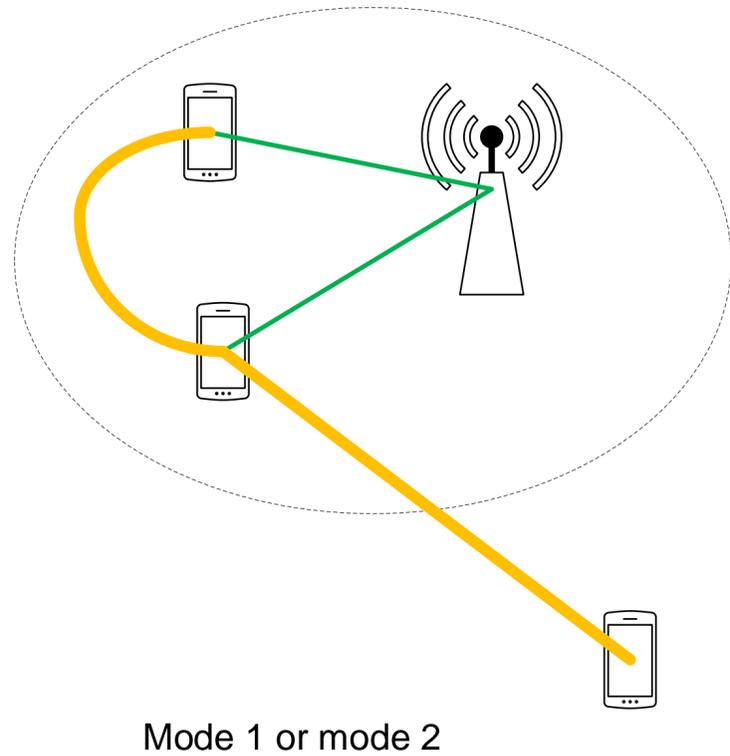
NOTE 3: Communication includes direct wireless links (UE to UE).

NOTE 4: Latency and reliability KPIs can vary based on specific use case/architecture, e.g. for cloud/edge/split rendering, and may be represented by a range of values.

NOTE 5: The decoding capability in the VR headset and the encoding/decoding complexity/time of the stream will set the required bit rate and latency over the direct wireless link between the tethered VR headset and its connected UE, bit rate from 100 Mbit/s to [10] Gbit/s and latency from 5 ms to 10 ms.

NOTE 6: The performance requirement is valid for the direct wireless link between the tethered VR headset and its connected UE.

Deployment scenarios



Support in-coverage, partial coverage and out of coverage scenarios

PC5 interface is based on unlicensed spectrum

Uu interface could be based on either licensed or unlicensed spectrum

At least support mode 1 and mode 2 or new resource allocation scheme introduced in R17 and R18

3GPP activities

3GPP SA1: study and work on Network Controlled Interactive Services (NCIS,R17)

- Use cases , requirement and KPIs of NCIS,100%, TR 22.842, TS22.261, OPPO

3GPP SA2: 5G System Enhancement for Advanced Interactive Services (5G_AIS, R17)

- to define potential QoS parameters e.g. new standardized 5QI(s), corresponding to new QoS requirements (from SA1 NCIS, and SA4 5GXR)
- Target end date is Sept 2020. kicked off? (0%,Tencent)

3GPP SA4: study on Extended Reality (XR) in 5G (FS_5GXR,R16)

- Identify use cases in the context of XR and 5G
- Break down the use cases in architectures, functions and interfaces
- Identify the technologies, requirements and gaps for different cases
- Develop conclusions and outcomes toward normative work in Rel-17
- TR 26.928, 100%, QC

3GPP SA6: study on application architecture for enabling Edge Applications (FS_EDGEAPP, R17)

- TR 23.758, 100%, Samsung

Thank you

oppo