CR-Form-v12.1

CHANGE REQUEST

22.847	**CR**	**<CR#>**	**rev**	**<Rev#>**	**Current version:**		**18.0.0**	

*For **HELP** on using this form: comprehensive instructions can be found at*
http://www.3gpp.org/Change-Requests.

Proposed change affects: UICC apps ☐ ME ☐ Radio Access Network ☐ Core Network ☐

Title:	TACMM Consolidation of KPIs
Source to WG:	China Mobile, Huawei, Interdigital, LG Electronic, Futurewei ?, , Xiaomi ?…
Source to TSG:	SA1
Work item code:	FS_TACMM
Date:	2021-10-14

Category:	B
Release:	Rel-18

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.

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:	The existing TR is missing clause 6: Consolidation of KPIs
Summary of change:	Adding clause 6: Consolidation of KPIs. The consolidated KPI table consolidates the existing KPI tables in TR22.847, and also take into account related CR regarding updating KPI tables on several use cases, including four CRs on clause 5.1, 5.2, 5.4, 5.5 respectively.
Consequences if not approved:	The TR will be imcomplete and there'll be no KPIs reference for downstream groups.

Clauses affected:	6

	Y	N		
Other specs		X	Other core specifications	TS/TR ... CR ...
affected:		X	Test specifications	TS/TR ... CR ...
(show related CRs)		X	O&M Specifications	TS/TR ... CR ...

Other comments:	

This CR's revision history:	

6 Consolidated requirements

6.2 Consolidated potential KPIs

The 5G system shall support tactile and multi-modal communication services with the following KPIs.

Table 6.2-1: Multi-modal communication service performance requirements

Use Cases	Characteristic parameter (KPI)			Influence quantity			Remarks
	Max allowed end-to-end latency	Service bit rate: user-experienced data rate	Reliability	Message size (byte)	UE Speed	Service Area	
Immersive multi-modal VR (UL: device → application sever)	5 ms (note 2)	16 kbit/s -2 Mbit/s (without haptic compression encoding); 0.8 - 200 kbit/s (with haptic compression encoding)	[99.9%] (without haptic compression encoding) [99.999%] (with haptic compression encoding)	1 DoF: 2-8 3 DoFs: 6-24 6 DoFs: 12-48 More DoFs may supported by the haptic device	Stationary or Pedestrian	several typically < 100 km^2 (note 5)	Haptic feedback
	5 ms	< 1Mbit/s	[99.99%]	MTU	Stationary or Pedestrian	several typically < 100 km^2 (note 5)	Sensing information e.g. user poisoning and view
Immersive multi-modal VR (DL: application sever → device)	10 ms (note1)	1-100 Mbit/s	[99.9%]	1500	Stationary or Pedestrian	several typically < 100 km^2 (note 5)	Video
	10 ms	5-512 kbit/s	[99.9%]	50	Stationary or Pedestrian	several typically < 100 km^2 (note 5)	Audio
	5 ms (note 2)	16 kbit/s -2 Mbit/s (without haptic compression encoding); 0.8 - 200 kbit/s (with haptic compression encoding)	[99.9%] (without haptic compression encoding) [99.999%] (with haptic compression encoding)	1 DoF: 2-8 3 DoFs: 6-24 6 DoFs: 12-48	Stationary or Pedestrian	several typically < 100 km^2 (note 5)	Haptic feedback
Remote control robot	[1-20ms]	16 kbit/s -2 Mbit/s (without haptic compression encoding); 0.8 - 200 kbit/s (with haptic compression encoding)	[99.99%]	2-8 (1 DoF)	high-dynamic (≤ 50 km/h)	≤ 1 km^2	Haptic feedback
	[20-100ms]	16 kbit/s -2 Mbit/s (without haptic compression encoding); 0.8 - 200 kbit/s (with haptic compression encoding)	[99.99%]	2-8 (1 DoF)	Stationary or Pedestrian	≤ 1 km^2	Haptic feedback
	5 ms	1-100 Mbit/s	[99.9%]	1500	Stationary or Pedestrian	≤ 1 km^2	Video
	5 ms	5-512 kbit/s	[99.9%]	[50-100]	Stationary or Pedestrian	≤ 1 km^2	Audio
	5 ms	< 1Mbit/s	[99.999%]	-	Stationary or Pedestrian	≤ 1 km^2	Sensing information
Skillset sharing low-dynamic robotics	5-10ms	0.8 - 200 kbit/s (with compression)	[99,999%]	1 DoF: 2-8 3 DoFs: 6-24 6 DoFs: 12-48	Stationary or Pedestrian	100 km^2	Haptic (position, velocity)

(including teleoperation) Controller to controlee							
Skillset sharing low-dynamic robotics (including teleoperation) Controlee to controller	5-10ms	0.8 - 200 kbit/s (with compression)	[99,999%]	1 DoF: 2-8 10 DoFs: 20-80 100 DoFs: 200-800	Stationary or Pedestrian	100 km^2	Haptic feedback
	10ms	1-100 Mbit/s	[99,999%]	1500	Stationary or Pedestrian	100 km^2	Video
	10ms	5-512 kbit/s	[99,9%]	50	Stationary or Pedestrian	100 km^2	Audio
Highly dynamic/ mobile robotics Controller to controlee	1-5ms	16 kbit/s -2 Mbit/s (without haptic compression encoding); 0.8 - 200 kbit/s (with haptic compression encoding)	[99,999%] (with compression) [99,9%] (w/o compression)	1 DoF: 2-8 3 DoFs: 6-24 6 DoFs: 12-48	high-dynamic	4 km2	Haptic (position, velocity)
Highly dynamic/ mobile robotics Controlee to controller	1-5ms	0.8 - 200 kbit/s	[99,999%] (with compression) [99,9%] (w/o compression)	1 DoF: 2-8 10 DoFs: 20-80 100 DoFs: 200-800	high-dynamic	4 km2	Haptic feedback
	1-10ms	1-10 Mbit/s	[99,999%]	[2-4]	high-dynamic	4 km2	Video
	1-10ms	100-500 kbit/s	[99,9%]	100	high-dynamic	4 km2	Audio
Immersive multi-modal navigation applications Remote Site → Local Site (DL)	50 ms [11]	16 kbit/s -2 Mbit/s (without haptic compression encoding); 0.8 - 200 kbit/s (with haptic compression encoding)	[99.999 %]	1 DoF: 2 to 8 10 DoF: 20 to 80 100 DoF: 200 to 800	Stationary or Pedestrian	≤ 10 km^2 (NOTE 5)	Haptic feedback
	<400 ms [11]	1-100 Mbit/s	[99.999 %]	1500	Stationary/ or Pedestrian,	≤ 10 km^2 (NOTE 5)	Video
	≤150 ms [11]	5-512 kbit/s	[99.9 %]	50	Stationary or Pedestrian	≤ 10 km^2 (NOTE 5)	Audio
	<300 ms	600 Mbit/s	[99.9 %]	MTU	Stationary or Pedestrian	≤ 10 km^2 (NOTE 5)	VR
Local Site → Remote Site (UL)	<300 ms	12 kbit/s [26]	[99.999 %]	1500	Stationary or Pedestrian	≤ 10 km^2 (NOTE 5)	Biometric / Affective
	<400 ms [11]	1-100 Mbit/s	[99.999 %]	1500	Workers: Stationary/ or Pedestrian, UAV: [30-300mph]	≤ 10 km^2 (NOTE 5)	Video
	≤150 ms [11]	5-512 kbit/s	[99.9 %]	50	Stationary or Pedestrian	≤ 10 km^2 (NOTE 5)	Audio
	<300 ms	600 Mbit/s	[99.9 %]	MTU	Stationary or Pedestrian	≤ 10 km^2 (NOTE 5)	VR

NOTE 1: Motion-to-photon delay (the time difference between the user's motion and corresponding change of the video image on display) should be less than 20ms, the communication latency for transfer the packets of one audio-visual media is less than 10ms, e.g. the packets corresponding to one video/audio frame are transferred to the devices within 10ms.

NOTE 2: Refer to IEEE 1918.1 [3] as for haptic feedback, the latency should be less than 25ms for accurately completing haptic operations. As rendering and hardware introduce some delay, the communication delay for haptic modality should be reasonably less than 5ms, i.e. the packets related to one haptic feedback are transferred to the devices within 10ms.

NOTE 3: Haptic feedback is typically haptic signal, such as force level, torque level, vibration and texture.

NOTE 4: The latency requirements are expected to be satisfied even when multimodal communication for skillset sharing is via indirect network connection (i.e., relayed by one UE to network relay).

NOTE 5:	In practice, the service area can vary depends on the actual deployment. In some cases a local approach (e.g. the application servers are hosted at the network edge) is preferred in order to satisfy the requirements of low latency and high reliability.

To support immersive multi-modal VR applications, the 5G system shall support the following synchronisation thresholds in order to avoid having a negative impact on the user experience (i.e. viewers detecting lack of synchronisation).

Table 6.2-2: Potential Key performance requirements for synchronization thresholds for immersive multi-modality VR applications

	synchronisation threshold	
audio-tactile	audio delay: [50 ms]	tactile delay: [25 ms]
visual-tactile	visual delay: [15 ms]	tactile delay: [50 ms]