

Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [Re-summarization of merged Usage Model Definitions parameters]

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Abstract: [Re-summarizing parameters of merged Usage Model Definitions]

Purpose: [To be considered in 15.3c Usage Model Document]

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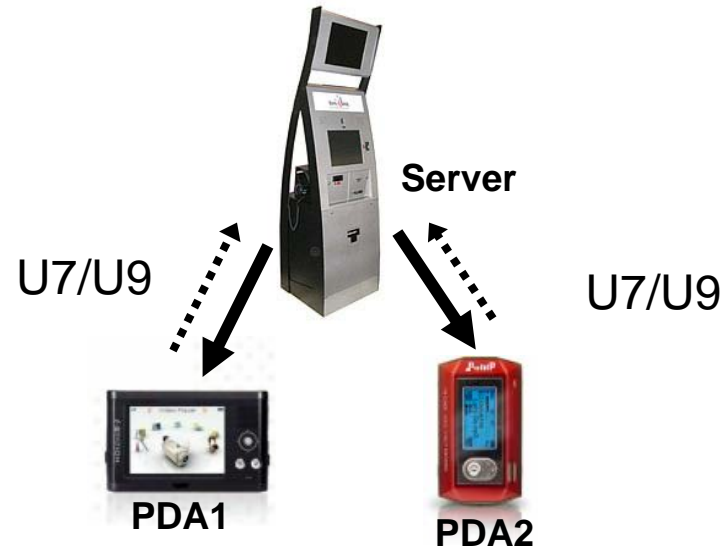
Re-summarization of merged Usage Model Definitions parameters

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Purpose of this document

- Proposal of UM5 (Kiosk file-downloading)
- Categorization of Usage Model Definitions (UMDs) and their data rate parameters considering “Mandatory” and “Optional” target data rate in TG3c
 - “Mandatory” UMDs are realized by more than 2-Gbps Mandatory PHY-SAP data rate
 - “Optional” UMDs are realized by more than 3-Gbps Optional PHY-SAP data rate

UM5 Kiosk file-downloading

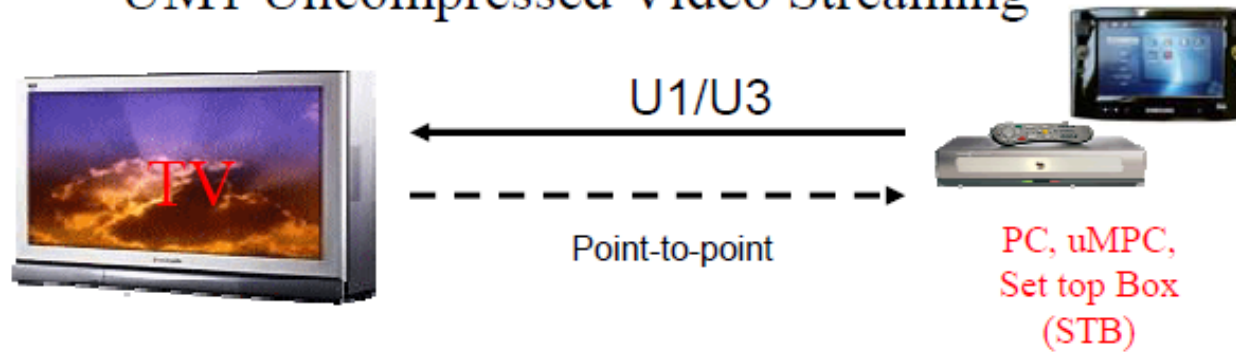


	Environment	Distance	Raw-data rate	PER	Note
Mandatory	LOS-Office (Server-PDA)	1 m	1 Gbps burst (shared by Server-PDA1 link and Server-PDA2 link)	10 % (with 1024 octet frames)	<ul style="list-style-type: none"> Asymmetric download/upload Link could be reversible Required Delay is N/A
Optional	LOS-Office (Server-PDA)	1 m	1.5 Gbps burst (shared by Server-PDA1 link and Server-PDA2 link)	10 % (with 1024 octet frames)	<ul style="list-style-type: none"> Asymmetric download/upload Link could be reversible Required Delay is N/A

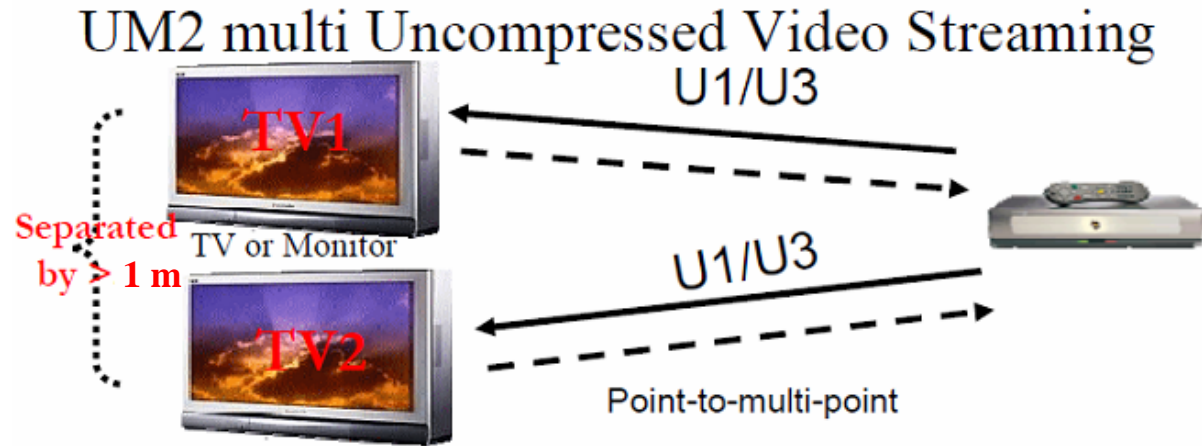
Note1: "Raw-data rate", "PER", and "Delay" are defined as the requirement at the top of MAC-SAP

Note2: "PER" is the required PER without re-transmission mode

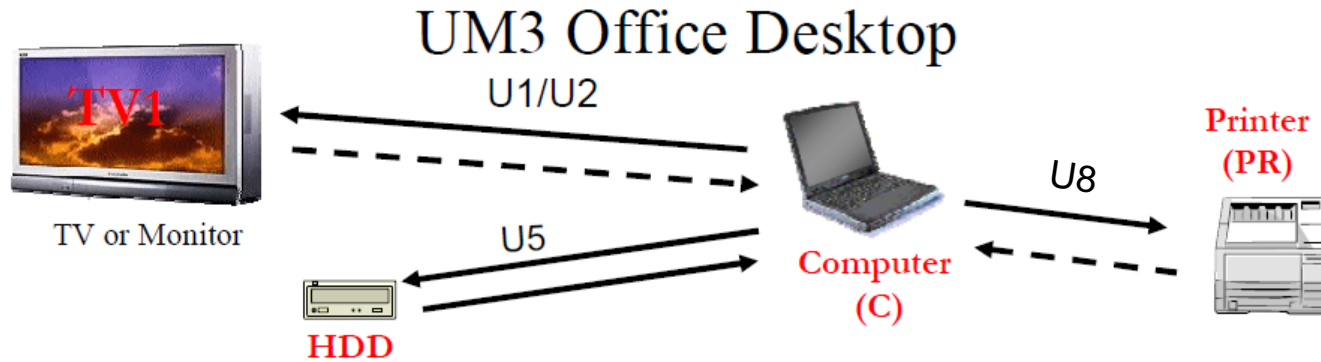
UM1 Uncompressed Video Streaming



	Environment	Distance	Raw-data rate	PiER	Note
Mandatory	LOS/NLOS-Residential (STB-TV)	5 m	1.493 Gbps (1920 x 1080i x 24bit x 60Hz)	$< 10^{-9}$ (8bit character error rate of less than 10^{-9} is recommended for HDMI TMDS)	<ul style="list-style-type: none"> No data retransmission required for video signal Low data rate reverse link is noted by dotted line
Optional	LOS/NLOS-Residential (STB-TV)	5 m	4.95 Gbps (HDMI v1.2)	$< 10^{-9}$ (8bit character error rate of less than 10^{-9} is recommended for HDMI TMDS)	<ul style="list-style-type: none"> Delay of less than a few frames is recommended Delay of less than 1 msec is recommended for the interface assuming HDCP

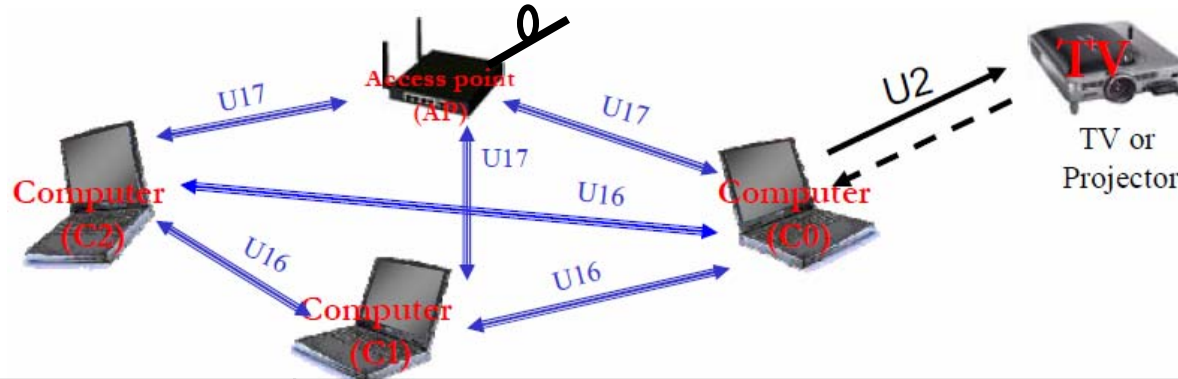


	Environment	Distance	Raw-data rate	PiER	Note
Mandatory	LOS-Residential (STB-TV1)	5 m	0.497 Gbps (720 x 480p x 24bit x 60Hz)	< 10 ⁻⁹ (8bit character error rate of less than 10 ⁻⁹ is recommended for HDMI TMDS)	<ul style="list-style-type: none"> No data retransmission required for video signal Low data rate reverse link is noted by dotted line Separation between TV1-TV2 is more than 1 m Different Video contents on each link
	NLOS-Residential (STB-TV2)		0.497 Gbps (720 x 480p x 24bit x 60Hz)		
Optional	LOS-Residential (STB-TV1)	5 m	4.95 Gbps (HDMI v1.2)	< 10 ⁻⁹ (8bit character error rate of less than 10 ⁻⁹ is recommended for HDMI TMDS)	<ul style="list-style-type: none"> Delay of less than several frames is recommended Delay of less than 1 msec is recommended for the interface assuming HDCP
	NLOS-Residential (STB-TV2)		4.95 Gbps (HDMI v1.2)		



	Environment	Distance	Raw-data rate	PiER/PER	Note
Mandatory	LOS Desktop (C-TV1)	1 m	1.258 Gbps stream (SXGA, 16bit *see appendix)	PiER of less than 10^{-9} is recommended for DVI-D	<ul style="list-style-type: none"> No data retransmission required for video signal (U1/U2) Low data rate reverse link is noted by dotted line (U1/U2) Asymmetric download/upload (U5, U8) Link could be reversible(U5, U8) Delay of less than several frames is recommended Required Delay is N/A
	LOS Desktop (C-HDD)	1 m	1 Gbps, burst (shared by U5 link and U8 link)	10 % (with 1024 octet frames)	
	NLOS Office (C-PR)	5 m			
Optional	LOS Desktop (C-TV1)	1 m	2.517 Gbps stream (SXGA, 32bit *see appendix)	PiER of less than 10^{-9} is recommended for DVI-D	<ul style="list-style-type: none"> No data retransmission required for video signal (U1/U2) Low data rate reverse link is noted by dotted line (U1/U2) Asymmetric download/upload (U5, U8) Link could be reversible(U5, U8) Delay of less than several frames is recommended Required Delay is N/A
	LOS Desktop (C-HDD)	1 m	1 Gbps, burst (shared by U5 link and U8 link)	10 % (with 1024 octet frames)	
	NLOS office (C-PR)	5 m			

UM4 Gb Conference Ad-hoc



	Environment	Distance	Raw-data rate	PIER/PER	Note
Mandatory	LOS Office	5 m	1.258 Gbps stream (SXGA, 16bit *see appendix)	PIER of less than 10^{-9} is recommended for DVI-D	<ul style="list-style-type: none"> No data retransmission required for video signal (U1/U2) Low data rate reverse link is noted by dotted line (U1/U2) AP is connected to wired LAN 1 Gbps burst file-transfer link is shared by U16 and U17 Delay of less than a few frames is recommended for U2 link Required Delay is N/A for U16/U17
	LOS Desktop (C0-C1-C2)	1 m	1 Gbps, burst (Equivalent to Gb Ethernet access)	10 % (with 1024 octet frames)	
	LOS Office (C0,C1,C2)-AP	3 m			
Optional	LOS Office	5 m	2.517 Gbps stream (SXGA, 32bit *see appendix)	PIER of less than 10^{-9} is recommended for DVI-D	<ul style="list-style-type: none"> No data retransmission required for video signal (U1/U2) Low data rate reverse link is noted by dotted line (U1/U2) AP is connected to wired LAN 1 Gbps burst file-transfer link is shared by U16 and U17 Delay of less than a few frames is recommended for U2 link Required Delay is N/A for U16/U17
	LOS Desktop (C0-C1-C2)	1 m	1 Gbps, burst (Equivalent to Gb Ethernet access)	10 % (with 1024 octet frames)	
	LOS Office (C0,C1,C2)-AP	3 m			

Summary

- Re-summarized the parameters of Usage Model Definitions
- Organized the parameters into two categories, “Mandatory” and “Optional” following the current target PHY-SAP data rate in TG3c
- This re-summarization was reviewed in CoMPA (Consortium for Millimeter-wave Practical Applications)

Appendix (Required raw data rate)

CEA-861-D Primary Video Format

Resolution	Frame rate	Raw data rate (24bit)
640 × 480p	59.94/60Hz	0.442 Gbps
1280 × 720p	59.94/60Hz	1.327 Gbps
1920 × 1080i	59.94/60Hz	1.493 Gbps
1920 × 1080p	60Hz	2.986 Gbps
720 × 480p	59.94/60Hz	0.497 Gbps
720(1440) × 480p	59.94/60Hz	0.497 (0.995) Gbps
1280 × 720p	50Hz	1.106 Gbps
1920 × 1080p	50Hz	2.488 Gbps
720 × 576p	50Hz	0.497 Gbps
720(1440) × 576p	50Hz	0.497(0.995) Gbps

DVI-D

Quality of graphic	Resolution (pixels)	16 bit color (Gbps)	32 bit color (Gbps)
QVGA (Quarter-VGA)	320 × 240	0.074	0.147
CGA	640 × 240	0.147	0.295
VGA	640 × 480	0.295	0.590
SVGA (Super-VGA)	800 × 600	0.461	0.922
XGA	1024 × 768	0.755	1.510
Quad-VGA	1280 × 960	1.180	2.359
SXGA (Super-XGA)	1280 × 1024	1.258	2.517
SXGA+	1400 × 1050	1.411	2.822
UXGA (Ultra-XGA)	1600 × 1200	1.843	3.686
QXGA (Quad-XGA)	2048 × 1536	3.020	6.040
QUXGA (Quad-Ultra-XGA)	3200 × 2400	7.373	14.746
QUXGA Wide	3840 × 2400	8.847	17.695

Note: A refresh rate of 60 Hz was assumed for the data rate calculations in the DVI table above.