3GPP TSG RAN1 #84bis
Busan, Korea, April 11 - 15, 2016
Agenda Item: 8.2.2

R1-163485

WF on O2I LSPs

Ericsson, Huawei

Background

- In Busan meeting, R1-163251 on LSP parameters for O2I has been agreed
  - The current measurements basis is repeated in Appendix A
- For outdoor to indoor propagation, two approaches are still on the table:
  - Approach 1. Reuse the values from the 3D SCM model
  - Approach 2. Use the 3D SCM values as starting point, but change some values based on the new measurements
  - Neither approach has any frequency-dependence of the LSPs, only for the O2I penetration loss
- Approach 1 has the advantage of maintaining consistency with 3D SCM and previous simulation results
- Approach 2 has the advantage of better representing the new measurements
- There has been some concern about whether the new measurements are fully representative of the UMa and UMi O2I scenarios
  - All new O2I measurements have been done in LOS and short distance (~5-50 m from Tx to building)
  - UMa and UMi should cover also longer distances and NLOS situations

Proposal

- Proposal: Adopt the LSP parameters in Appendix B for the O2I links in the UMa and UMi scenarios
  - Use “proposed values” column
  - 3D SCM values are given for information, proposed changes compared to 3D SCM are highlighted in yellow
  - Values in square brackets can be FFS

Appendix A: O2I LSP measurements

Copied from R1-163251

		36.873	DOCOMO	Ericsson				KT	CMCC/BUPT	Huawei		
Frequency [GHz]			20	2.44	5.8	14.8	58.68	28	3.5	6	28	73
Delay spread (DS) $\log_{10}([s])$	m_{DS}	-6.62	-7.29	-7.42	-7.36	-7.24	-7.09	-8.07		-7.78	-7.89	-7.87
	ε_{DS}	0.32	0.34	0.49	0.46	0.53	0.45	0.54		0.32	0.17	0.13
AoD spread (σ_{ASD}) $\log_{10}([°])$	m_{ASD}	1.25										
	ε_{ASD}	0.42										
AoA spread (σ_{ASA}) $\log_{10}([°])$	m_{ASA}	1.76	1.62					1.51		1.8	1.72	1.69
	ε_{ASA}	0.16	0.24					0.30		0.11	0.08	0.06
ZoA spread (σ_{ZSA}) $\log_{10}([°])$[2)]	m_{ZSA}	1.01	0.5					0.43	0.86	0.9	0.81	0.79
	ε_{ZSA}	0.43	0.46					0.25	0.26	0.01	0.03	0.04
Shadow fading (SF) [dB]	s_{SF}	7						5.59				

		36.873	DOCOMO	KT	CMCC/BUPT
Frequency [GHz]			20	28	3.5
Cross-Correlations	ASD vs DS	0.4			
	ASA vs DS	0.4	0.25		
	ASA vs SF	0		0.53	
	ASD vs SF	0.2			
	DS vs SF	-0.5		0.7	
	ASD vs ASA	0			
	ASD vs K	N/A			
	ASA vs K	N/A			
	DS vs K	N/A			
	SF vs K	N/A			
Cross-Correlations 1)	ZSD vs SF	0			-0.15
	ZSA vs SF	0		0.68	0.13
	ZSD vs K	N/A			
	ZSA vs K	N/A			
	ZSD vs DS	-0.6	0.12	0.64	-0.73
	ZSA vs DS	-0.2			-0.53
	ZSD vs ASD	-0.2			-0.21
	ZSA vs ASD	0			0.42
	ZSD vs ASA	0			-0.21
	ZSA vs ASA	0.5	0.15	0.41	0.13
	ZSD vs ZSA	0.5			0.38

		36.873	DOCOMO	KT	CMCC/BUPT	Huawei		
Frequency [GHz]			20	28	3.5	6	28	73
Cross-Correlations	ASD vs DS	0.4						
Delay distribution		Exp		Exp				
AoD and AoA distribution		Wr G		Lapl				
ZoD and ZoA distribution		Lapl		Lapl	Lapl			
Delay scaling parameter r_τ		2.2		2.96				
XPR [dB] 6)	m	9						
	s	5						
Number of clusters		12	6	2		4	4	4
Number of rays per cluster		20	50	15				
Cluster ASD		5						
Cluster ASA		8	36	25		18.19	11.48	7.07
Cluser ZSA 2)		3	5	3.7	7	7.58	7.12	4.07
Per cluster shadowing std z [dB]		4						
Correlation distance in the horizontal plane [m] 3)	DS	10						
	ASD	11						
	ASA	17						
	SF	7						
	K	N/A						
	ZSA	25			25			
	ZSD	25			25			

Appendix B: O2I LSP parameters

Table 1. Parameters summary for O-to-I(part1)

		36.873	Proposed values
Delay spread (DS) $\log_{10}([s])$	μ_{DS}	-6.62	[-6.62]
	ε_{DS}	0.32	[0.32]
AoD spread (σ_{ASD}) $\log_{10}([°])$	μ_{ASD}	1.25	1.25
	ε_{ASD}	0.42	0.42
AoA spread (σ_{ASA}) $\log_{10}([°])$	μ_{ASA}	1.76	1.76
	ε_{ASA}	0.16	0.16
ZoA spread (σ_{ZSA}) $\log_{10}([°])$	μ_{ZSA}	1.01	1.01
	ε_{ZSA}	0.43	0.43
XPR [dB]	μ	9	9
	σ	5	5
Correlation distance in the horizontal plane [m]	DS	10	10
	ASD	11	11
	ASA	17	17
	SF	7	7
	K	N/A	N/A
	ZSA	25	25
	ZSD	25	25
Delay distribution		EXP	EXP
AoD and AoA distribution		Wrapped Gaussian	Wrapped Gaussian
ZoD and ZoA distribution		Laplacian	Laplacian
Delay scaling parameter r_τ		2.2	2.2

Appendix B: O2I LSP parameters

Table 2. Parameters summary for O-to-I(part2)

		36.873	Proposed values
Cross-Correlations	*ASD* vs *DS*	0.4	0.4
	ASA vs *DS*	0.4	0.25
	ASA vs *SF*	0	0.53
	ASD vs *SF*	0.2	0.2
	DS vs *SF*	-0.5	-0.5
	ASD vs *ASA*	0	0
	ASD vs *K*	N/A	N/A
	ASA vs *K*	N/A	N/A
	DS vs *K*	N/A	N/A
	SF vs *K*	N/A	N/A
	ZSD vs *SF*	0	-0.15
	ZSA vs *SF*	0	0.4
	ZSD vs *K*	N/A	N/A
	ZSA vs *K*	N/A	N/A
	ZSD vs *DS*	-0.6	0.01
	ZSA vs *DS*	-0.2	-0.53
	ZSD vs *ASD*	-0.2	-0.2
	ZSA vs *ASD*	0	0.42
	ZSD vs *ASA*	0	-0.21
	ZSA vs *ASA*	0.5	0.23
	ZSD vs *ZSA*	0.5	0.38

Appendix B: O2I LSP parameters

Table 3. Parameters summary for O-to-I(part3)

	36.873	Proposed values
Number of cluster	12	[12]
Number of rays per cluster	20	[20]
Cluster ASD	5	5
Cluster ASA	8	20
Cluster ZSA	3	6
Per cluster shadowing std [dB]	4	4