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Re:	This contribution is in the response of call for contribution issued for 802.16j project on July 3rd, 2006.
Abstract	This document provides a Tapped Delay Line channel model for link-level 802.16 simulations. The model is optimized for mesh and relay links in an urban scenario. Radio channel parameters are provided for 5MHz and 10MHz bandwidths for a wide variety of link types. These include communication from basestation to relay-station, relay-station to mobile-station, and mobile-station to mobile-station.
Purpose	For approval and submission to IEEE 802.16j for system evaluation methodology
Notice	
Release	
Patent Policy and Procedures	

Tapped Delay Line Channel Model and Parameter Settings for Link-Level 802.16 Simulations

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Introduction

In order to simulate 802.16j candidate systems there is a need for an agreed multi-hop radio channel model that supports radio links between a basestation (BS), a relay-station (RS) and a mobile station (MS). This document proposes a suitable channel model for BS-RS, BS-MS, RS-RS, RS-MS and MS-MS links. Existing channel models, such as COST 259 [5] and the 3GPP Spatial Channel model (SCM) [6], are designed for BS-MS links, and are not valid for multi-hop relay systems.

This document proposes a Tapped Delay Line (TDL) model together with suggested parameter settings for a range of link types. This includes models for the MS-MS and RS-MS link. The model is derived for a dense urban environment and parameters have been computed for a carrier frequency of 2GHz and 5GHz. Channel bandwidths of 5 MHz and 10 MHz are supported. The model is based on street-level mobile terminals.

The model includes a number of advanced parameters for each tap in the TDL (active probability, K-factor and RMS Angular Spread (AS)). The parameters were extracted from a vast channel data set predicted using a detailed 3-D ray tracing model. The ray model has previously been validated for radio channels with antennas mounted well below the rooftop [1-4].

Work is currently ongoing to generate a suitable Power Doppler Profile (PDP) from the angular spread information. A Doppler filter is generated to filter the uncorrelated time series on a per tap basis to produce a time-correlated model. This approach is similar to that used in the 3GPP, 802.11n and SUI models. Interim results from a Matlab implementation of the suggested model are given in this paper.

The proposed models are suitable for 802.16j link-level simulations (i.e. multi-hop and relay systems).

The Model Structure

The proposed TDL models are categorized into one of ten radio scenarios, each of which is relevant for a multi-hop relay network. For LoS and NLoS conditions we model the BS-RS link, the BS-MS link, the RS-RS link, the RS-MS link and the MS-MS link. For each radio scenario, a number of TDL models are proposed for channels of different bandwidth and RMS Delay Spread (DS). For each TDL model, a set of parameters (including the active probability, the mean power relative to the strongest tap, the K-factor, and the RMS AS) are assigned to each tap. The structure of the model is shown in Figure 1.

The large scale behavior of the channel (e.g. changes in the local mean path loss and RMS Delay Spread) should be determined using a suitable path loss and shadowing model (e.g. the models presented in [7,8], which are specified for radio channels where antennas are located below the rooftop). The small scale behavior of the channel is modelled using a TDL. The fast fading on each tap is modelled by its K-factor. The RMS Angular Spread (AS) is provided for each tap.

The definition of the model parameters are explained in the following section. A description of the parameter extraction process is also provided. A step-by-step implement guide is then given at the end of the document together with a set of parameter tables for each scenario, carrier frequency and operating bandwidth.

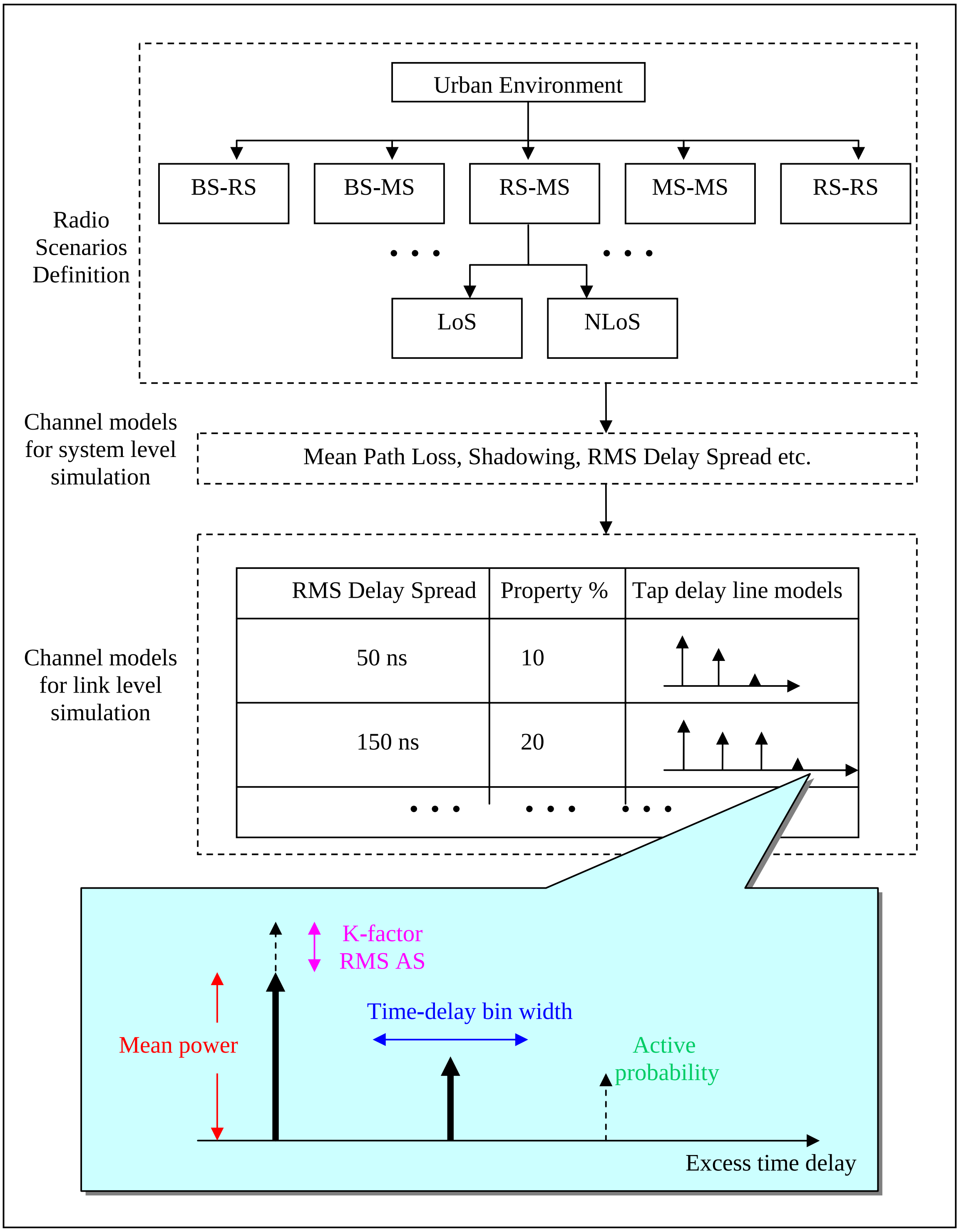

Figure 1: Model Structure

Model Parameters

The parameters in the proposed model can be categorized into three groups. The first group includes system-wide parameters that are specific to the IEEE 802.16 radio system. The second group includes parameters that are necessary to define the system level channel model. The third group includes parameters that specify the parameters of the TDL. These parameters for each group are defined and explained in Table 1.

Table 1: Model parameters

Parameters		Symbol	Value	Description
System specialized parameters	Carrier Frequency	F_C	2 [GHz] and 5 [GHz]	Carrier Frequency.
	Carrier Bandwidth	W_C	5 [MHz] and 10 [MHz]	System Bandwidth. This determines the bin width of the time taps.
	Radio Scenario		BS-MS NLoS, etc.	BS-RS, BS-MS, RS-RS, RS-MS and MS-MS) for LoS and NLoS conditions.
Channel parameters from system level simulation	Received Local Mean Power	P	[dBm]	The total power of all taps. Determined by the mean path loss and shadowing model.
	Local Mean RMS DS	μ_{DS}	* [ns]	The Local Mean RMS Delay Spread determines which TDL channel model should be used.
	RMS DS Probability	p_{DS}	* [%]	The PDF of the Local Mean RMS Delay Spread is extracted for each defined Radio Scenario.
Parameters for time-delay taps	Time-delay Bin Width	W_{Bin}	1/ W_C, [ns]	Time-delay Bin Width of each tap. This parameter is used to extracting other tap parameters (e.g. power, K-factor) from the raw channel data set. It also determines the excess time delay of each tap.
	Tap excess time-delay	t_n $n=1,\ldots,N$	$(n-1)\ W_{Bin}$	The excess time delay of each tap
	Tap Mean Power (for Active Tap)	P_n, $n=1,\ldots,N$	* [dB]	This is the normalized power for each tap (the strongest tap has unity power).
	Tap power dynamic range	P_{Min}	-25[dB]	The minimum tap power (related to the strongest tap) used in the model.
	Tap Active Probability	p_{An}, $n=1,\ldots,N$	* [%]	The probability that the mean power of the tap is within the modelled dynamic range.
	Tap K-factor (for Active Tap)	K_n, $n=1,\ldots,N$	* [dB]	The mean K-factor of each tap.
	Tap RMS AS (for Active Tap)	AS_n, $n=1,\ldots,N$	* [degree]	The mean RMS Angular Spread of each tap.

Note: the values marked as '*' were extracted from channel data predicted by a 3-D ray tracing model, and listed in Appendix A.

Tapped Delay Line extraction process

Ray trace simulations

To obtain the required parameter values for the TDL model, a large amount of channel data was generated for each Radio Scenario using a detailed 3-D ray tracing model [1]. The ray model uses the geographical data (terrain, building, foliage and ground cover data) to predict point-to-point power, as well as time, frequency and spatial dispersion. The model was developed at the University of Bristol and is validated in [1-4].

Simulation trials are based on locations in the centre of Bristol. This urban environment is representative of a European city with typical three-storey building heights. The average building height and road width for this region is 12m (including pitched roofs) and 20m (including pavement) respectively. The height of the BS antennas was 15m above ground level (AGL). The height of the relay stations was 5m (lamppost height). The height of the mobile stations was 1.5m. A vertical dipole antenna with a typical antenna gain of 2dBi was used for all radio nodes.

Simulations were conducted over a 1.2km x 1.2km area. A total of 26 different transmitter (Tx) sites were used. These sites were spread over the entire map as shown in Figure 2. The receive (Rx) points were spread over the trial area on a rectangular grid with the spacing between adjacent grid points set to 11m. Rx points lying inside building locations are ignored, and the model is therefore limited to outdoor usage. Excluding building locations, where receivers were not be placed, a total of 26 x 9,003 Tx-Rx links were analyzed for each defined channel type (BS-RS, BS-MS, RS-RS, RS-MS and MS-MS).

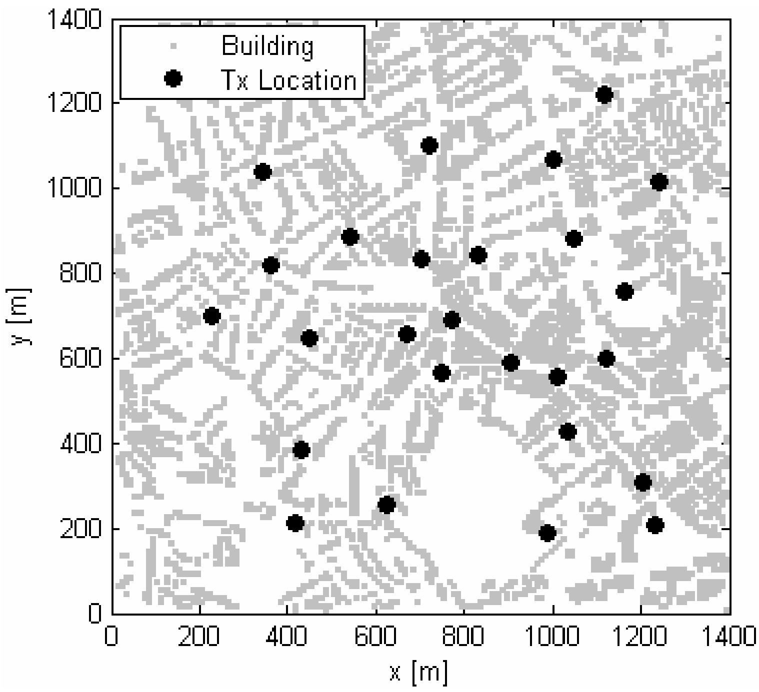

Figure 2: Tx Locations used in the Ray Model simulations

Parameter extraction

For each radio scenario, we extract a set of TDL models for different RMS DS intervals. For each interval, the mean RMS DS value μ_{DS} and the associated probability p_{DS} of occurrence are derived. The RMS DS intervals are determined such that the interval is small enough to avoid smearing the shape of the TDL model, while being large enough to include an adequate number of channel data samples. The RMS DS PDFs for 10 radio scenarios in the 2GHz and 5GHz bands are listed in Appendix A.

The extraction procedure for each TDL model is described below:

1. The directional channel impulse response (DCIR) is predicted from the ray model for each Tx-Rx pair according to the radio scenario.
2. The time-delay of all rays in the DCIR is aligned to the first arrival ray (hence the first arrival ray has zero excess delay)
3. The DCIR are converted into TDL channel samples by splitting the power of each ray into adjacent taps, as shown in Figure 3. The direction of arrival of the 'tapped' ray is the same as the original ray, and its power is calculated using the following equation:

$$P_{tapped\_ray1} = \left(1 - \frac{\Delta\tau_1}{W_{bin}}\right) P_{ray} \qquad (1)$$

4. Calculate the power in each tap by summing the power of all rays contributing to that tap.
5. Normalize the power of each tap so the total power is unity.
6. Label each tap as being 'active' or 'non-active' according to whether its power is within the dynamic power range (P_{Min}), -25dB in this case. Extract the Active Probability (p_{An}) of each tap.
7. Obtain the mean power of each tap by averaging the power over 'active' taps across the TDL channel samples of each radio scenario.
8. Extract the normalized mean power (P_n) of each tap by normalizing the mean power obtained in step 7 to the strongest tap.
9. Extract the mean K-factor (K_n) for each tap by averaging the K-factor over the 'active' taps across the TDL channel samples.
10. Extract the mean RMS AS (AS_n) for each tap by averaging the RMS AS over the 'active' taps across the TDL channel samples.

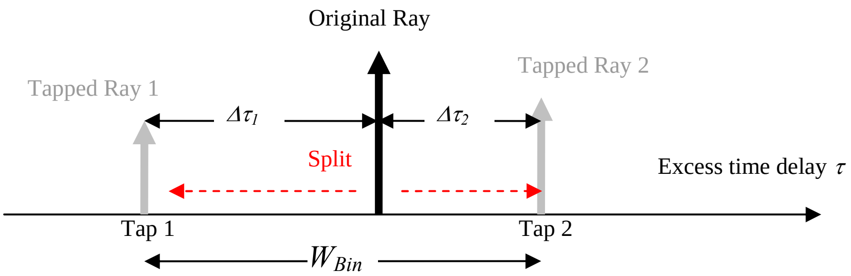

Figure 3: Split one ray into two adjacent taps

Model Implementation

The proposed TDL model can be implemented via the following steps:

Step 1. Determine the radio scenario, e.g. RS-MS LoS, MS-MS NLoS etc.

Step 2. Determine the RMS DS according to its PDF for the radio scenario in step 1, and choose the appropriate TDL model.

Step 3. Determine which taps are active according to their Active Probability (p_{An}). Set the power of each active tap to its mean power (P_n), and set the power of all non-active taps to zero (linear value). Figure 4 shows examples of the resultant static channel models for a RS-MS link.

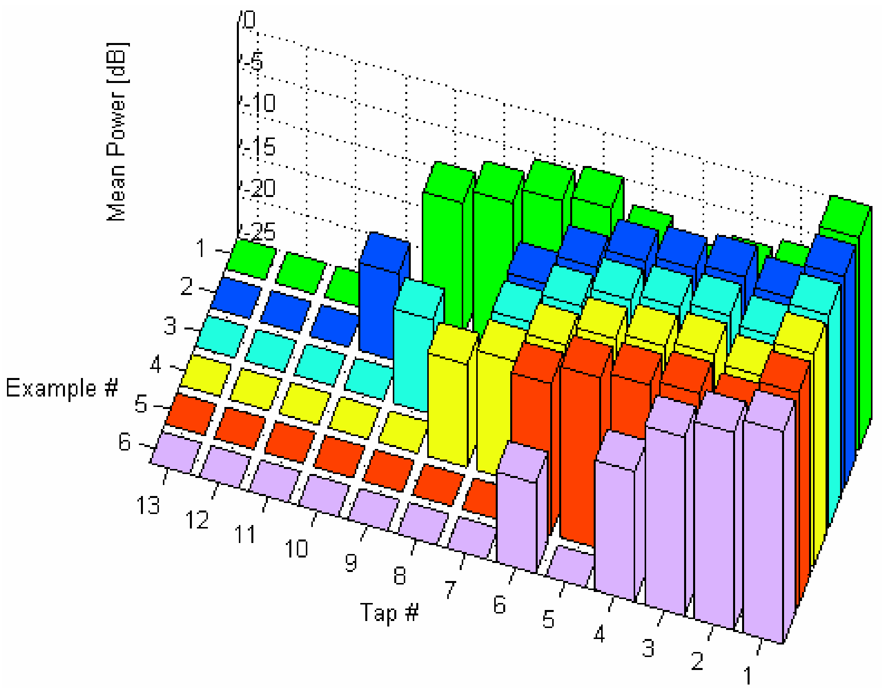

Figure 4: Examples of generated static RS-MS NLoS channels, *Fc* = 2GHz, *Wc* = 10MHz

Step 4. Normalize the total power of all active taps according to the output of the path loss and shadowing models (e.g. the models presented in [7,8] which are specified for radio channels where antennas are located below rooftop). Alternatively, the power can be set to unity if Packet Error Rate vs Signal to Noise Ratio plots are desired.

Step 5. For each tap, generate a set of complex zero-mean Gaussian distributed coefficients with variance equal to $\sigma^2/2$. This yields a complex signal sequence of Rayleigh samples (with K-factor K= 0, linear scale). To obtain Ricean channel signals (K>0), a constant path component A has to be added to the Rayleigh set of coefficients. The ratio of powers between this constant part and the Rayleigh part (i.e. A^2/σ^2) is specified by the K-factor (K_n) for each delay tap in the TDL model.

Step 6. The signals generated in the last step are uncorrelated random variables. The spatial/temporal correlation can be introduced by passing the Gaussian random (before combining with the constant path component A) sequence through a Doppler filter with its frequency response related to the Doppler Spectrum $S(f)$. Specifically, the frequency response $H(f)$ of the Doppler filter is given by $|H(f)| = \sqrt{S(f)}$. For a fixed wireless channel, where the Doppler Effect is introduced by the motion of surrounding scatterers, the 'rounded' Doppler Spectrum used in the SUI model [9] is suggested. In cases where the transceiver is moving through the city, the Doppler Spectrum of each tap can be calculated from the Power Angular Spectrum (PAS) [10].

$$S(f) = a \cdot PAS(\theta)G(\theta) \Big/ \sqrt{1-\left(\frac{f-f_c}{f_m}\right)^2}, \quad \cos\theta = \frac{f-f_c}{f_m} \qquad (2)$$

where $PAS(\theta)$ is the power angular spectrum function with $\theta \in [-\pi, \pi]$ is the angle w.r.t. the mobile movement direction, and $G(\theta)$ is the antenna pattern; f_c is the carrier frequency; f_m is the maximum Doppler frequency which is determined by the mobile's velocity v ($f_m = |v| / \lambda_c$); a is a normalize factor which ensures the total power of $S(f)$ is unity.

The PAS is commonly assumed to follow either a Uniform or Laplacian distribution. The uniform distribution is recommended as suggested in the 3GPP-SCM for an urban microcellular BS-MS link [6]. The width of the angular spread ($W_{\theta n}$) of the uniform distribution is determined by the corresponding RMS AS (AS_n) and K-factor (K_n) for each delay tap in the TDL model. We assume the dominant path is located at the centre of the PAS, as shown in Figure 5. We can now write:

$$AS_n = \sqrt{\frac{\int_{-W_{\theta n}/2}^{W_{\theta n}/2} \theta^2 \frac{\sigma^2}{W_{\theta n}} d\theta + A^2}{A^2 + \sigma^2}}; \quad K_n = \frac{A^2}{\sigma^2} \qquad (3)$$

$$\Rightarrow \quad W_{\theta n} = \sqrt{12[(K_n + 1)AS_n^{\ 2} - K_n]} \qquad (4)$$

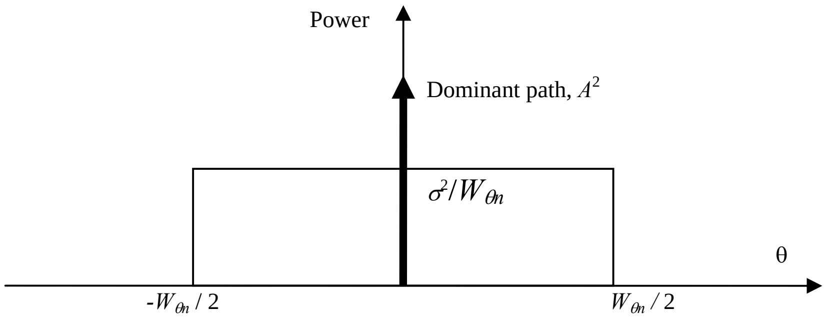

Figure 5: PAS of uniform distribution

Figure 6 shows an example of the resultant correlated fading response for the RS-MS NLoS channel, with Fc = 2GHz and Wc = 10MHz. The mobile movement direction is assumed at the dominant path direction. Omni antenna pattern is also assumed.

Conclusion

This document has presented a TDL model for BS-RS, BS-MS, RS-RS, RS-MS and MS-MS links in an urban environment. The model is proposed for use in the analysis and assessment of 802.16j candidate schemes.

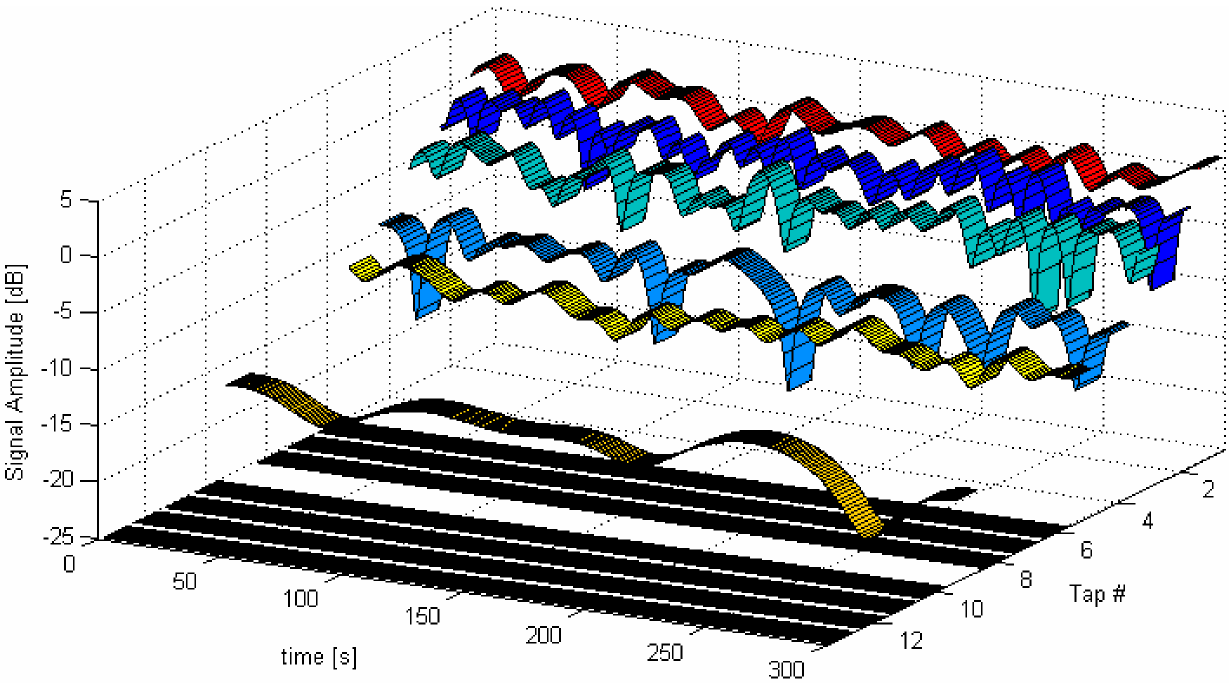

Figure 6: Example of generated signal fading, RS-MS NLoS channel, *Fc* = 2GHz, *Wc* = 10MHz

References

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Appendix A

Tapped Time-Delay Line Model Parameter Tables

This page contains the model parameters for radio scenario BS-RS-LOS, Fc: 2GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	10	30	50	80
Probability [%]	0.1	0.67	0.18	0.05
Model #	1	2	3	4

Model.1 (RMS DS = 10 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.86	0	0	0
Power [dB]	0	-16.8	-	-	-
K-factor [dB]	15	0	-	-	-
RMS AS [degree]	13	68	-	-	-

Model.2 (RMS DS = 30 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.85	0.13	0	0
Power [dB]	0	-15.3	-24	-	-
K-factor [dB]	16	-2	-5	-	-
RMS AS [degree]	13	71	50	-	-

Model.3 (RMS DS = 50 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.81	0.8	0.01	0
Power [dB]	0	-13.9	-21.7	-24.2	-
K-factor [dB]	16	-4	-6	-3	-
RMS AS [degree]	12	66	59	56	-

Model.4 (RMS DS = 80 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.88	0.79	0.47	0.09
Power [dB]	0	-11.5	-18.5	-23	-23.5
K-factor [dB]	15	-4	-5	-4	-3
RMS AS [degree]	14	68	65	37	5

This page contains the model parameters for radio scenario BS-RS-NLOS, Fc: 2GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.42	0.4	0.15	0.04
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.82	0.43	0.13	0.02	0	0
Power [dB]	0	-5.1	-14.9	-19.2	-21	-21.8	-	-
K-factor [dB]	5	1	1	2	4	5	-	-
RMS AS [degree]	19	27	26	16	7	3	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.94	0.89	0.52	0.16	0.02	0
Power [dB]	0	-2.8	-4.1	-10.2	-15.4	-17.4	-19	-
K-factor [dB]	7	1	2	2	3	5	8	-
RMS AS [degree]	18	32	22	17	10	4	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.94	0.95	0.9	0.44	0.08	0
Power [dB]	0	-5.9	-4.4	-3.2	-9	-14.5	-18.7	-
K-factor [dB]	8	1	1	3	3	5	7	-
RMS AS [degree]	12	35	23	12	9	4	1	-

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.87	0.93	0.95	0.89	0.3	0.02
Power [dB]	0	-8.1	-10.6	-6.1	-2.7	-8.5	-19.3	-22.1
K-factor [dB]	9	1	1	2	4	5	7	9
RMS AS [degree]	10	31	29	15	6	3	2	1

This page contains the model parameters for radio scenario RS-RS-LOS, Fc: 2GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	10	30	50	80
Probability [%]	0.21	0.67	0.09	0.02
Model #	1	2	3	4

Model.1 (RMS DS = 10 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.81	0	0	0
Power [dB]	0	-16.8	-	-	-
K-factor [dB]	14	0	-	-	-
RMS AS [degree]	12	63	-	-	-

Model.2 (RMS DS = 30 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.86	0.1	0	0
Power [dB]	0	-15.4	-23.8	-	-
K-factor [dB]	15	-3	-6	-	-
RMS AS [degree]	12	68	44	-	-

Model.3 (RMS DS = 50 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.9	0.84	0.01	0
Power [dB]	0	-13.9	-22.2	-23.5	-
K-factor [dB]	16	-4	-5	1	-
RMS AS [degree]	10	62	62	27	-

Model.4 (RMS DS = 80 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.76	0.88	0.38	0.03
Power [dB]	0	-10.7	-17.1	-22.5	-24.5
K-factor [dB]	12	-5	-6	-2	1
RMS AS [degree]	12	60	73	44	5

This page contains the model parameters for radio scenario RS-RS-NLOS, Fc: 2GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.47	0.39	0.12	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.83	0.41	0.12	0.02	0	0
Power [dB]	0	-2.7	-13.5	-18.5	-20.4	-20.8	-	-
K-factor [dB]	4	2	2	3	4	5	-	-
RMS AS [degree]	11	17	17	11	5	2	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.94	0.89	0.48	0.13	0.01	0
Power [dB]	0	-1.4	-3.2	-9.8	-15.6	-17.2	-18.5	-
K-factor [dB]	6	1	2	3	4	6	8	-
RMS AS [degree]	10	22	16	12	7	3	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.96	0.94	0.95	0.9	0.42	0.06	0
Power [dB]	0	-4.6	-4	-3.3	-8.3	-14.5	-19.1	-
K-factor [dB]	7	1	1	3	4	5	6	-
RMS AS [degree]	7	24	19	9	6	3	1	-

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.96	0.89	0.94	0.97	0.9	0.29	0.01
Power [dB]	0	-5.8	-10.7	-6.8	-1.7	-7.7	-20.4	-22.2
K-factor [dB]	7	1	1	2	5	6	6	10
RMS AS [degree]	5	18	24	11	4	2	2	1

This page contains the model parameters for radio scenario MS-MS-LOS, Fc: 2GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	10	30	50	80
Probability [%]	0.3	0.6	0.06	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 10 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.82	0	0	0
Power [dB]	0	-16.9	-	-	-
K-factor [dB]	14	-1	-	-	-
RMS AS [degree]	12	61	-	-	-

Model.2 (RMS DS = 30 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.86	0.11	0	0
Power [dB]	0	-15.6	-23.8	-	-
K-factor [dB]	15	-2	-7	-	-
RMS AS [degree]	11	64	54	-	-

Model.3 (RMS DS = 50 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.83	0.81	0	0
Power [dB]	0	-14	-22.2	-	-
K-factor [dB]	14	-4	-5	-	-
RMS AS [degree]	12	60	48	-	-

Model.4 (RMS DS = 80 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.76	0.92	0.2	0.02
Power [dB]	0	-10.9	-18.1	-23.5	-24.1
K-factor [dB]	12	-5	-6	-5	2
RMS AS [degree]	17	57	32	23	1

This page contains the model parameters for radio scenario MS-MS-NLOS, Fc: 2GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.5	0.38	0.1	0.02
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.84	0.39	0.1	0.01	0	0
Power [dB]	0	-1.5	-12.8	-18.1	-20	-20.8	-	-
K-factor [dB]	3	2	2	3	4	6	-	-
RMS AS [degree]	12	15	16	9	4	2	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.94	0.9	0.46	0.12	0.01	0
Power [dB]	0	-0.6	-2.4	-9.4	-15.2	-17	-18.1	-
K-factor [dB]	4	1	2	3	4	6	7	-
RMS AS [degree]	9	20	14	10	6	2	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.96	0.93	0.95	0.9	0.43	0.05	0
Power [dB]	0	-3.9	-4	-2.9	-7.8	-14.5	-18.8	-
K-factor [dB]	6	1	2	4	5	5	8	-
RMS AS [degree]	7	22	18	8	5	2	1	-

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.96	0.87	0.93	0.96	0.91	0.27	0.02
Power [dB]	0	-5.1	-11.7	-7.3	-1.8	-7.9	-20.4	-20.4
K-factor [dB]	7	2	1	3	4	6	7	10
RMS AS [degree]	5	16	27	10	3	2	1	1

This page contains the model parameters for radio scenario BS-MS-LOS, Fc: 2GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	10	30	50	80
Probability [%]	0.11	0.67	0.17	0.05
Model #	1	2	3	4

Model.1 (RMS DS = 10 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.84	0	0	0
Power [dB]	0	-17	-	-	-
K-factor [dB]	15	0	-	-	-
RMS AS [degree]	13	67	-	-	-

Model.2 (RMS DS = 30 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.84	0.13	0	0
Power [dB]	0	-15.4	-23.8	-	-
K-factor [dB]	15	-3	-5	-	-
RMS AS [degree]	14	68	44	-	-

Model.3 (RMS DS = 50 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.87	0.87	0.02	0
Power [dB]	0	-13.5	-21.7	-24.8	-
K-factor [dB]	15	-5	-6	-5	-
RMS AS [degree]	13	65	63	30	-

Model.4 (RMS DS = 80 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.9	0.93	0.45	0.05
Power [dB]	0	-11.2	-17.6	-23	-24.2
K-factor [dB]	13	-5	-6	-5	-1
RMS AS [degree]	13	64	73	30	4

This page contains the model parameters for radio scenario BS-MS-NLOS, Fc: 2GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.44	0.39	0.14	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.83	0.41	0.12	0.02	0	0
Power [dB]	0	-4	-14.7	-19.1	-20.8	-21.5	-	-
K-factor [dB]	4	1	1	2	4	5	-	-
RMS AS [degree]	23	27	26	16	6	3	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.94	0.89	0.5	0.15	0.02	0
Power [dB]	0	-2.2	-3.8	-10	-15.5	-17.4	-18.7	-
K-factor [dB]	6	1	2	2	4	5	8	-
RMS AS [degree]	21	33	21	16	10	4	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.94	0.95	0.9	0.44	0.08	0
Power [dB]	0	-5.7	-4.5	-3.1	-9	-14.8	-18.5	-
K-factor [dB]	7	1	1	3	3	5	7	-
RMS AS [degree]	15	35	23	12	9	4	2	-

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.96	0.88	0.92	0.96	0.9	0.3	0.01
Power [dB]	0	-7.8	-11	-6.2	-2.5	-8	-18.7	-21.9
K-factor [dB]	8	2	1	2	4	5	8	8
RMS AS [degree]	11	31	29	15	5	3	1	0

This page contains the model parameters for radio scenario RS-MS-LOS, Fc: 2GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	10	30	50	80
Probability [%]	0.24	0.65	0.08	0.02
Model #	1	2	3	4

Model.1 (RMS DS = 10 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.83	0	0	0
Power [dB]	0	-16.9	-	-	-
K-factor [dB]	15	0	-	-	-
RMS AS [degree]	12	60	-	-	-

Model.2 (RMS DS = 30 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.83	0.11	0	0
Power [dB]	0	-15.6	-23.7	-	-
K-factor [dB]	15	-2	-6	-	-
RMS AS [degree]	12	65	45	-	-

Model.3 (RMS DS = 50 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.86	0.81	0.03	0
Power [dB]	0	-14	-22	-24.1	-
K-factor [dB]	16	-4	-5	2	-
RMS AS [degree]	10	61	66	6	-

Model.4 (RMS DS = 80 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.85	0.85	0.27	0.03
Power [dB]	0	-12.3	-16.5	-22.5	-23.8
K-factor [dB]	15	-6	-7	-7	1
RMS AS [degree]	10	63	74	28	5

This page contains the model parameters for radio scenario RS-MS-NLOS, Fc: 2GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.49	0.38	0.11	0.02
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.83	0.4	0.11	0.02	0	0
Power [dB]	0	-2.3	-13.5	-18.4	-20.3	-20.9	-	-
K-factor [dB]	4	2	2	3	4	5	-	-
RMS AS [degree]	15	19	19	11	5	2	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.94	0.89	0.47	0.13	0.01	0
Power [dB]	0	-1.2	-3	-9.8	-15.6	-17.2	-18.6	-
K-factor [dB]	5	1	2	3	4	6	6	-
RMS AS [degree]	12	24	17	12	7	3	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.96	0.93	0.95	0.9	0.41	0.06	0
Power [dB]	0	-4.6	-4.1	-3.1	-8.5	-14.8	-19.1	-
K-factor [dB]	7	1	2	3	4	5	7	-
RMS AS [degree]	9	26	19	9	6	3	2	-

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.96	0.9	0.93	0.97	0.9	0.29	0.01
Power [dB]	0	-5.6	-10.8	-6.9	-1.7	-7.4	-20.6	-21.6
K-factor [dB]	7	2	1	2	5	6	6	6
RMS AS [degree]	7	19	24	11	4	2	1	1

This page contains the model parameters for radio scenario BS-RS-LOS, Fc: 2GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	10	30	50	80
Probability [%]	0.1	0.67	0.18	0.05
Model #	1	2	3	4

Model.1 (RMS DS = 10 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.85	0.32	0	0	0	0	0
Power [dB]	0	-16.1	-23.8	-	-	-	-	-
K-factor [dB]	15	0	0	-	-	-	-	-
RMS AS [degree]	10	66	50	-	-	-	-	-

Model.2 (RMS DS = 30 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.88	0.82	0.19	0.02	0	0	0
Power [dB]	0	-15.3	-20.7	-23.7	-24.3	-	-	-
K-factor [dB]	18	-1	-3	-3	-2	-	-	-
RMS AS [degree]	7	67	61	40	2	-	-	-

Model.3 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.89	0.87	0.72	0.29	0.04	0	0
Power [dB]	0	-15.5	-17.2	-20.7	-23.8	-24.3	-	-
K-factor [dB]	17	-1	-3	-4	-3	-4	-	-
RMS AS [degree]	5	58	58	51	28	7	-	-

Model.4 (RMS DS = 80 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.91	0.95	0.74	0.66	0.44	0.13	0.11
Power [dB]	0	-14.2	-14.4	-18.5	-21.1	-23.4	-23.9	-23.2
K-factor [dB]	17	-1	-3	-2	-3	0	-1	0
RMS AS [degree]	5	56	53	58	50	34	18	1

This page contains the model parameters for radio scenario BS-RS-NLOS, Fc: 2GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.42	0.4	0.15	0.04
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.91	0.84	0.7	0.52	0.36	0.21	0.11	0.05	0.02	0.01	0	0
Power [dB]	0	-6.4	-9	-12.9	-15.4	-16.9	-18.2	-19	-19.7	-20	-20.7	-	-
K-factor [dB]	8	3	3	3	4	4	5	5	6	7	7	-	-
RMS AS [degree]	10	23	21	16	13	10	7	4	3	2	1	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.92	0.87	0.86	0.86	0.79	0.63	0.43	0.28	0.16	0.07	0.02	0
Power [dB]	0	-7.1	-5.8	-5.4	-6.5	-8.7	-11.4	-13.5	-14.5	-15.4	-16	-17	-
K-factor [dB]	10	2	2	3	3	4	4	5	6	6	6	8	-
RMS AS [degree]	8	26	23	18	15	12	10	7	4	2	2	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.94	0.8	0.79	0.83	0.86	0.88	0.77	0.58	0.39	0.2	0.07	0.01
Power [dB]	0	-8.9	-9.4	-10.5	-8.9	-5.4	-5.8	-8.7	-10.9	-12.3	-14.1	-15.9	-16.6
K-factor [dB]	10	3	2	2	3	3	4	4	5	6	6	8	14
RMS AS [degree]	6	22	24	22	17	12	9	7	5	3	2	1	0

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.96	0.77	0.67	0.66	0.68	0.74	0.83	0.89	0.79	0.51	0.22	0.06
Power [dB]	0	-10.7	-11.9	-12.8	-13.1	-13.2	-11.1	-6.2	-5.1	-7.4	-10.3	-14.9	-15.6
K-factor [dB]	10	3	3	3	3	3	3	4	5	5	6	8	15
RMS AS [degree]	5	20	23	21	19	17	11	6	4	3	2	1	0

This page contains the model parameters for radio scenario RS-RS-LOS, Fc: 2GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	10	30	50	80
Probability [%]	0.21	0.67	0.09	0.02
Model #	1	2	3	4

Model.1 (RMS DS = 10 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.83	0.37	0	0	0	0	0
Power [dB]	0	-15.6	-23.8	-	-	-	-	-
K-factor [dB]	15	-1	-2	-	-	-	-	-
RMS AS [degree]	8	61	48	-	-	-	-	-

Model.2 (RMS DS = 30 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.88	0.83	0.16	0	0	0	0
Power [dB]	0	-15.2	-20.9	-23.6	-	-	-	-
K-factor [dB]	18	-2	-3	-4	-	-	-	-
RMS AS [degree]	7	64	59	43	-	-	-	-

Model.3 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.94	0.91	0.71	0.23	0.05	0	0
Power [dB]	0	-15.3	-17.3	-21.3	-23.3	-24	-	-
K-factor [dB]	18	-2	-4	-3	-2	2	-	-
RMS AS [degree]	5	56	55	54	34	9	-	-

Model.4 (RMS DS = 80 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.88	0.88	0.91	0.85	0.41	0.09	0.03
Power [dB]	0	-12.7	-13.6	-17.2	-20.6	-21.9	-23	-24.6
K-factor [dB]	17	-3	-3	-3	-3	-1	1	2
RMS AS [degree]	4	34	57	63	62	31	2	5

This page contains the model parameters for radio scenario RS-RS-NLOS, Fc: 2GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.47	0.39	0.12	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.92	0.87	0.73	0.53	0.34	0.19	0.09	0.05	0.02	0.01	0	0
Power [dB]	0	-2.8	-4.9	-10.1	-12.7	-14.7	-16.1	-17.1	-17.7	-18	-18.3	-	-
K-factor [dB]	7	3	3	3	4	5	6	5	6	6	5	-	-
RMS AS [degree]	6	13	12	10	8	6	5	3	2	1	1	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.93	0.89	0.88	0.87	0.78	0.6	0.39	0.24	0.13	0.06	0.02	0
Power [dB]	0	-5	-3.7	-4.4	-5.1	-7.7	-11.2	-13	-13.9	-14.9	-15.5	-15.9	-
K-factor [dB]	9	2	2	3	4	4	5	5	6	6	7	8	-
RMS AS [degree]	4	14	14	12	9	8	6	4	2	2	1	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.96	0.85	0.81	0.82	0.84	0.86	0.77	0.58	0.37	0.17	0.05	0.01
Power [dB]	0	-7.2	-7.9	-10	-7.9	-4.9	-6.1	-7.7	-9.3	-11.7	-13.7	-15.6	-17.8
K-factor [dB]	9	3	3	3	3	4	5	5	6	6	6	8	11
RMS AS [degree]	3	12	16	16	12	8	6	5	3	2	1	1	0

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.97	0.81	0.71	0.64	0.61	0.72	0.85	0.93	0.82	0.51	0.18	0.03
Power [dB]	0	-7.4	-9.2	-12.1	-12.9	-13.2	-12.3	-5.9	-3.6	-5.9	-10.7	-16.4	-18.4
K-factor [dB]	10	3	3	3	4	4	3	5	6	6	6	7	8
RMS AS [degree]	2	10	13	14	14	11	7	4	2	2	1	1	0

This page contains the model parameters for radio scenario MS-MS-LOS, Fc: 2GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	10	30	50	80
Probability [%]	0.3	0.6	0.06	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 10 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.83	0.39	0	0	0	0	0
Power [dB]	0	-16	-23.8	-	-	-	-	-
K-factor [dB]	15	-2	-3	-	-	-	-	-
RMS AS [degree]	8	60	57	-	-	-	-	-

Model.2 (RMS DS = 30 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.87	0.83	0.18	0.01	0	0	0
Power [dB]	0	-15.4	-21	-23.4	-24.3	-	-	-
K-factor [dB]	16	-2	-4	-4	-4	-	-	-
RMS AS [degree]	7	60	57	45	12	-	-	-

Model.3 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.88	0.95	0.73	0.28	0.04	0	0
Power [dB]	0	-14.9	-18.1	-21.5	-23.2	-24.4	-	-
K-factor [dB]	17	-2	-3	-3	-3	2	-	-
RMS AS [degree]	6	53	56	48	31	0	-	-

Model.4 (RMS DS = 80 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.88	0.84	0.94	0.76	0.2	0.06	0.02
Power [dB]	0	-12.4	-13.5	-17.2	-20.9	-24	-24.5	-24.3
K-factor [dB]	17	-1	-4	-3	-4	-2	-4	3
RMS AS [degree]	6	43	38	34	27	17	10	1

This page contains the model parameters for radio scenario MS-MS-NLOS, Fc: 2GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.5	0.38	0.1	0.02
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.92	0.88	0.73	0.51	0.32	0.16	0.08	0.04	0.02	0	0	0
Power [dB]	0	-0.4	-2.4	-8.2	-10.9	-13.4	-14.9	-15.7	-16.5	-17	-	-	-
K-factor [dB]	6	3	3	4	5	5	7	6	6	6	-	-	-
RMS AS [degree]	6	12	11	9	6	5	4	2	2	1	-	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.94	0.91	0.89	0.88	0.78	0.59	0.37	0.22	0.12	0.05	0.01	0
Power [dB]	0	-3.5	-2.5	-3.6	-4	-6.6	-10.7	-12.2	-13.4	-14.2	-15.5	-15.7	-
K-factor [dB]	7	3	3	3	4	5	6	5	6	7	6	9	-
RMS AS [degree]	3	11	12	10	8	6	5	3	2	1	1	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.96	0.85	0.8	0.8	0.82	0.85	0.76	0.58	0.37	0.15	0.04	0.01
Power [dB]	-4.2	-10.3	-11.2	-13.3	-12	-8.9	-9.6	-11.2	-12.6	-15.2	-17.8	-19.6	-18.8
K-factor [dB]	9	3	3	3	3	5	6	5	6	6	7	8	15
RMS AS [degree]	3	10	14	14	10	7	5	3	2	1	1	1	0

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.97	0.81	0.69	0.59	0.54	0.69	0.83	0.92	0.85	0.5	0.16	0.03
Power [dB]	0	-6.4	-8.3	-11.7	-13.2	-14.2	-12.8	-5.5	-3.4	-5.9	-10.7	-16.6	-17.5
K-factor [dB]	9	4	4	3	4	4	4	5	6	7	7	9	10
RMS AS [degree]	2	7	11	12	14	11	6	3	2	1	1	1	1

This page contains the model parameters for radio scenario BS-MS-LOS, Fc: 2GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	10	30	50	80
Probability [%]	0.11	0.67	0.17	0.05
Model #	1	2	3	4

Model.1 (RMS DS = 10 ns)

Tap #	1	2	3	4	5	6	7	8	9
Active Probability [%]	1	0.83	0.35	0	0	0	0	0	0
Power [dB]	0	-16.2	-23.8	-	-	-	-	-	-
K-factor [dB]	16	-1	-1	-	-	-	-	-	-
RMS AS [degree]	10	62	46	-	-	-	-	-	-

Model.2 (RMS DS = 30 ns)

Tap #	1	2	3	4	5	6	7	8	9
Active Probability [%]	1	0.86	0.81	0.2	0.02	0	0	0	0
Power [dB]	0	-15.3	-20.8	-23.7	-24.1	-	-	-	-
K-factor [dB]	16	-2	-3	-3	-2	-	-	-	-
RMS AS [degree]	9	65	60	42	2	-	-	-	-

Model.3 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9
Active Probability [%]	1	0.89	0.92	0.78	0.32	0.05	0	0	0
Power [dB]	0	-14.9	-16.8	-21	-23.7	-24	-	-	-
K-factor [dB]	16	-1	-4	-5	-3	-1	-	-	-
RMS AS [degree]	8	59	52	53	30	20	-	-	-

Model.4 (RMS DS = 80 ns)

Tap #	1	2	3	4	5	6	7	8	9
Active Probability [%]	1	0.91	0.92	0.91	0.81	0.38	0.11	0.11	0.01
Power [dB]	0	-13.4	-14.3	-17.2	-21.1	-23.6	-24.1	-24	-24.6
K-factor [dB]	16	-2	-4	-4	-4	-2	-2	0	2
RMS AS [degree]	6	47	60	65	59	24	22	2	3

This page contains the model parameters for radio scenario BS-MS-NLOS, Fc: 2GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.44	0.39	0.14	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	0.99	0.92	0.86	0.7	0.51	0.34	0.2	0.1	0.05	0.02	0.01	0	0
Power [dB]	0	-4.3	-7.6	-12	-14.8	-16.3	-17.7	-18.4	-19	-19.2	-19.7	-	-
K-factor [dB]	7	3	3	3	4	4	5	5	6	7	7	-	-
RMS AS [degree]	14	24	20	16	12	9	7	4	3	2	1	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.92	0.87	0.86	0.86	0.78	0.62	0.41	0.26	0.15	0.07	0.02	0
Power [dB]	0	-5.9	-5.1	-4.8	-6	-8.2	-11.1	-13.3	-14.5	-15.1	-15.8	-16.9	-
K-factor [dB]	9	3	2	3	4	4	4	5	6	6	6	8	-
RMS AS [degree]	10	27	23	17	14	11	9	6	4	2	2	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.94	0.81	0.78	0.82	0.86	0.88	0.77	0.57	0.38	0.2	0.07	0.01
Power [dB]	0	-8.2	-9.4	-10.5	-8.9	-5.3	-5.6	-8.6	-10.7	-12.4	-13.8	-15.4	-15.9
K-factor [dB]	9	3	3	3	3	4	4	4	5	5	7	8	16
RMS AS [degree]	8	23	24	21	17	11	8	6	5	3	2	1	0

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.96	0.74	0.66	0.63	0.66	0.73	0.82	0.89	0.8	0.51	0.23	0.05
Power [dB]	0	-10.5	-11.5	-12.8	-13.3	-13.5	-10.9	-5.5	-4.8	-7.1	-9.9	-14	-15.1
K-factor [dB]	9	3	3	3	3	3	4	5	5	6	6	9	17
RMS AS [degree]	5	20	23	20	18	16	11	6	4	2	2	1	0

This page contains the model parameters for radio scenario RS-MS-LOS, Fc: 2GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	10	30	50	80
Probability [%]	0.24	0.65	0.08	0.02
Model #	1	2	3	4

Model.1 (RMS DS = 10 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.81	0.38	0	0	0	0	0
Power [dB]	0	-16	-23.8	-	-	-	-	-
K-factor [dB]	16	-1	-3	-	-	-	-	-
RMS AS [degree]	9	60	57	-	-	-	-	-

Model.2 (RMS DS = 30 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.88	0.81	0.18	0.01	0	0	0
Power [dB]	0	-15.4	-21.2	-23.5	-24.2	-	-	-
K-factor [dB]	17	-2	-3	-3	-4	-	-	-
RMS AS [degree]	8	62	58	39	19	-	-	-

Model.3 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.91	0.93	0.74	0.27	0.03	0	0
Power [dB]	0	-15.3	-17.6	-21.3	-23.5	-23.9	-	-
K-factor [dB]	18	-2	-3	-3	-2	2	-	-
RMS AS [degree]	5	59	56	53	52	5	-	-

Model.4 (RMS DS = 80 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	1	0.79	0.88	0.79	0.3	0.18	0.03
Power [dB]	0	-13	-15.5	-16.8	-20.7	-22.8	-22.7	-24
K-factor [dB]	19	-2	-4	-5	-4	-3	-5	1
RMS AS [degree]	3	37	59	70	65	20	15	6

This page contains the model parameters for radio scenario RS-MS-NLOS, Fc: 2GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.49	0.38	0.11	0.02
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	0.99	0.92	0.87	0.72	0.52	0.33	0.18	0.09	0.04	0.02	0.01	0	0
Power [dB]	0	-1.8	-4	-9.7	-12.3	-14.4	-15.9	-16.7	-17.5	-17.8	-17.5	-	-
K-factor [dB]	6	3	3	3	4	5	6	5	6	6	5	-	-
RMS AS [degree]	8	16	14	11	8	6	5	3	2	1	1	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.94	0.89	0.88	0.87	0.78	0.59	0.38	0.23	0.12	0.05	0.01	0
Power [dB]	0	-4.3	-3.4	-4.1	-4.9	-7.3	-10.9	-12.9	-13.9	-14.7	-15.2	-15.5	-
K-factor [dB]	8	3	3	3	4	4	5	5	6	7	6	8	-
RMS AS [degree]	5	16	16	13	10	8	6	4	2	2	1	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.95	0.84	0.8	0.82	0.84	0.87	0.76	0.57	0.36	0.16	0.04	0.01
Power [dB]	0	-6.9	-8.1	-9.9	-7.8	-4.9	-5.7	-7.6	-9.3	-12	-14.5	-15.3	-17.8
K-factor [dB]	9	3	3	3	3	4	5	5	6	6	7	9	14
RMS AS [degree]	4	13	17	16	12	8	6	4	3	2	1	1	0

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.96	0.81	0.71	0.64	0.6	0.71	0.83	0.91	0.83	0.52	0.17	0.03
Power [dB]	0	-7.1	-8.9	-11.9	-12.2	-13.4	-12.2	-5.4	-3.6	-5.4	-10.6	-16	-18.2
K-factor [dB]	10	4	3	3	4	4	4	5	5	6	6	8	11
RMS AS [degree]	3	10	14	15	13	11	7	4	2	2	1	1	1

This page contains the model parameters for radio scenario BS-RS-LOS, Fc: 5GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	5	15	25
Probability [%]	0.21	0.6	0.11
Model #	1	2	3

Model.1 (RMS DS = 5 ns)

Tap #	1	2	3
Active Probability [%]	1	0.85	0
Power [dB]	0	-19.1	-
K-factor [dB]	17	6	-
RMS AS [degree]	5	31	-

Model.2 (RMS DS = 15 ns)

Tap #	1	2	3
Active Probability [%]	1	0.84	0
Power [dB]	0	-17.9	-
K-factor [dB]	17	2	-
RMS AS [degree]	8	53	-

Model.3 (RMS DS = 25 ns)

Tap #	1	2	3
Active Probability [%]	1	0.72	0
Power [dB]	0	-16.6	-
K-factor [dB]	14	0	-
RMS AS [degree]	12	64	-

Model.4 (RMS DS = 40 ns)

Tap #	1	2	3
Active Probability [%]	1	0.7	0.5
Power [dB]	0	-15.2	-23.1
K-factor [dB]	14	-2	-2
RMS AS [degree]	16	86	32

This page contains the model parameters for radio scenario BS-RS-NLOS, Fc: 5GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.49	0.35	0.13	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.76	0.37	0.1	0.02	0	0
Power [dB]	0	-6.7	-16.2	-19.8	-21.6	-22.3	-	-
K-factor [dB]	6	2	2	3	4	6	-	-
RMS AS [degree]	14	23	22	12	6	3	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.94	0.92	0.87	0.45	0.14	0.02	0
Power [dB]	0	-4.2	-5.1	-11.3	-16.4	-17.9	-19.3	-
K-factor [dB]	9	1	3	3	4	6	10	-
RMS AS [degree]	13	29	17	13	7	3	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.91	0.94	0.86	0.37	0.07	0
Power [dB]	0	-8.2	-5.1	-3.8	-9.9	-15	-18.2	-
K-factor [dB]	10	1	2	4	4	6	9	-
RMS AS [degree]	9	33	20	10	7	3	1	-

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.94	0.81	0.91	0.95	0.88	0.28	0.02
Power [dB]	0	-10.2	-12	-6.4	-2.5	-9.5	-19.4	-21.9
K-factor [dB]	10	2	2	3	5	6	8	10
RMS AS [degree]	8	29	25	12	4	3	1	1

This page contains the model parameters for radio scenario RS-RS-LOS, Fc: 5GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	5	15	25	40
Probability [%]	0.41	0.53	0.05	0
Model #	1	2	3	-

Model.1 (RMS DS = 5 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.79	0	0
Power [dB]	0	-18.9	-	-
K-factor [dB]	16	5	-	-
RMS AS [degree]	5	29	-	-

Model.2 (RMS DS = 15 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.84	0	0
Power [dB]	0	-18.1	-	-
K-factor [dB]	17	2	-	-
RMS AS [degree]	8	49	-	-

Model.3 (RMS DS = 25 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.68	0.08	0
Power [dB]	0	-16.2	-24.5	-
K-factor [dB]	16	0	3	-
RMS AS [degree]	13	46	5	-

This page contains the model parameters for radio scenario RS-RS-NLOS, Fc: 5GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.56	0.33	0.09	0.02
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.77	0.34	0.08	0.01	0	0
Power [dB]	0	-5	-15.9	-19.6	-21.3	-21.7	-	-
K-factor [dB]	5	2	2	3	4	4	-	-
RMS AS [degree]	8	14	14	7	3	2	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.94	0.93	0.86	0.4	0.1	0.01	0
Power [dB]	0	-3	-4.4	-11.3	-16.6	-18	-19.1	-
K-factor [dB]	7	1	2	4	4	6	10	-
RMS AS [degree]	7	18	12	8	5	2	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.91	0.94	0.85	0.31	0.05	0
Power [dB]	0	-7.5	-4.8	-3.7	-10.9	-15.5	-18.2	-
K-factor [dB]	9	1	3	4	4	6	10	-
RMS AS [degree]	5	21	13	6	4	2	1	-

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.84	0.9	0.97	0.87	0.19	0.01
Power [dB]	0	-9.2	-12.9	-5.5	-2.7	-10.7	-19.2	-18.5
K-factor [dB]	11	2	1	3	4	4	7	10
RMS AS [degree]	5	21	22	7	2	2	1	1

This page contains the model parameters for radio scenario MS-MS-LOS, Fc: 5GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	5	15	25	40
Probability [%]	0.5	0.41	0.05	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 5 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.79	0	0
Power [dB]	0	-18.5	-	-
K-factor [dB]	15	5	-	-
RMS AS [degree]	7	32	-	-

Model.2 (RMS DS = 15 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.87	0.11	0
Power [dB]	0	-18.2	-20.1	-
K-factor [dB]	16	3	4	-
RMS AS [degree]	8	44	24	-

Model.3 (RMS DS = 25 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.79	0.23	0
Power [dB]	0	-17.1	-11.9	-
K-factor [dB]	18	0	2	-
RMS AS [degree]	7	42	28	-

Model.4 (RMS DS = 40 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.83	0.42	0
Power [dB]	0	-16.5	-22.8	-
K-factor [dB]	15	0	-2	-
RMS AS [degree]	12	37	10	-

This page contains the model parameters for radio scenario MS-MS-NLOS, Fc: 5GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.6	0.31	0.07	0.01
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.77	0.33	0.07	0.01	0	0
Power [dB]	0	-3.9	-15.2	-19.4	-20.9	-20.9	-	-
K-factor [dB]	4	2	2	4	5	5	-	-
RMS AS [degree]	9	13	13	6	3	2	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.94	0.93	0.84	0.36	0.08	0.01	0
Power [dB]	0	-2.3	-4.2	-11.5	-16.8	-18.1	-19.4	-
K-factor [dB]	6	1	2	4	5	5	9	-
RMS AS [degree]	7	18	11	7	4	2	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.91	0.95	0.83	0.31	0.04	0
Power [dB]	0	-6.1	-4.6	-3.5	-9.7	-16.6	-19.3	-
K-factor [dB]	7	1	2	4	5	5	8	-
RMS AS [degree]	6	21	14	5	3	2	1	-

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.81	0.93	0.95	0.86	0.19	0.02
Power [dB]	0	-7.7	-13.8	-5.8	-2.5	-13.1	-20.3	-17.7
K-factor [dB]	9	2	1	4	5	6	8	11
RMS AS [degree]	5	18	22	5	2	1	1	0

This page contains the model parameters for radio scenario BS-MS-LOS, Fc: 5GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	5	15	25	40
Probability [%]	0.21	0.62	0.12	0.04
Model #	1	2	3	4

Model.1 (RMS DS = 5 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.76	0	0
Power [dB]	0	-19	-	-
K-factor [dB]	17	5	-	-
RMS AS [degree]	5	34	-	-

Model.2 (RMS DS = 15 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.85	0	0
Power [dB]	0	-17.7	-	-
K-factor [dB]	17	1	-	-
RMS AS [degree]	10	55	-	-

Model.3 (RMS DS = 25 ns)

Tap #	1	2	3	4
Active Probability [%]	1	1	0.03	0
Power [dB]	0	-16.4	-19.1	-
K-factor [dB]	16	-1	1	-
RMS AS [degree]	11	65	9	-

Model.4 (RMS DS = 40 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.77	0.62	0
Power [dB]	0	-13.9	-23.2	-
K-factor [dB]	15	-3	-2	-
RMS AS [degree]	19	75	38	-

This page contains the model parameters for radio scenario BS-MS-NLOS, Fc: 5GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.52	0.34	0.11	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.76	0.34	0.09	0.02	0	0
Power [dB]	0	-5.8	-16.1	-19.8	-21.5	-22.1	-	-
K-factor [dB]	5	2	2	3	4	5	-	-
RMS AS [degree]	18	25	23	12	6	3	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.94	0.93	0.86	0.43	0.12	0.02	0
Power [dB]	0	-3.7	-4.9	-11.2	-16.3	-18	-19	-
K-factor [dB]	8	1	3	3	5	6	11	-
RMS AS [degree]	17	31	17	13	7	3	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.94	0.91	0.94	0.87	0.36	0.06	0
Power [dB]	0	-7.6	-4.9	-3.6	-10	-15.2	-19	-
K-factor [dB]	9	1	2	4	5	6	9	-
RMS AS [degree]	11	34	19	9	6	3	1	-

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.94	0.83	0.89	0.95	0.87	0.26	0.01
Power [dB]	0	-10.4	-13.1	-6.5	-3.2	-9.7	-18.3	-22
K-factor [dB]	9	2	2	3	6	6	8	7
RMS AS [degree]	8	29	25	11	4	2	1	0

This page contains the model parameters for radio scenario RS-MS-LOS, Fc: 5GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	5	15	25	40
Probability [%]	0.45	0.51	0.05	0
Model #	1	2	3	-

Model.1 (RMS DS = 5 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.79	0	0
Power [dB]	0	-19	-	-
K-factor [dB]	17	5	-	-
RMS AS [degree]	6	33	-	-

Model.2 (RMS DS = 15 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.86	0	0
Power [dB]	0	-18.1	-	-
K-factor [dB]	16	2	-	-
RMS AS [degree]	9	48	-	-

Model.3 (RMS DS = 25 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.82	0.08	0
Power [dB]	0	-16.7	-22.6	-
K-factor [dB]	16	-1	3	-
RMS AS [degree]	9	39	6	-

This page contains the model parameters for radio scenario RS-MS-NLOS, Fc: 5GHz, Wc: 5MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.58	0.32	0.08	0.01
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.95	0.77	0.33	0.08	0.01	0	0
Power [dB]	0	-4.6	-16	-19.8	-21.4	-21.4	-	-
K-factor [dB]	5	2	2	3	4	4	-	-
RMS AS [degree]	11	17	16	8	3	2	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.94	0.93	0.86	0.38	0.09	0.01	0
Power [dB]	0	-2.5	-4.2	-11.3	-16.4	-18.1	-18.3	-
K-factor [dB]	7	1	2	3	4	6	10	-
RMS AS [degree]	10	22	13	9	4	3	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.94	0.91	0.94	0.84	0.3	0.04	0
Power [dB]	0	-7.3	-4.4	-3.7	-11.3	-15.4	-18.1	-
K-factor [dB]	9	1	2	3	4	5	11	-
RMS AS [degree]	7	26	15	6	4	2	1	-

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8
Active Probability [%]	1	0.96	0.82	0.93	0.97	0.84	0.17	0.01
Power [dB]	0	-8.6	-14	-5.6	-2.6	-11.8	-21.3	-23.8
K-factor [dB]	10	2	1	4	4	5	6	12
RMS AS [degree]	6	23	23	6	2	2	1	0

This page contains the model parameters for radio scenario BS-RS-LOS, Fc: 5GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	5	15	25	40
Probability [%]	0.21	0.6	0.11	0.08
Model #	1	2	3	4

Model.1 (RMS DS = 5 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.83	0	0	0
Power [dB]	0	-18.9	-	-	-
K-factor [dB]	17	5	-	-	-
RMS AS [degree]	5	31	-	-	-

Model.2 (RMS DS = 15 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.82	0.17	0	0
Power [dB]	0	-17.5	-23.9	-	-
K-factor [dB]	18	1	-1	-	-
RMS AS [degree]	6	49	41	-	-

Model.3 (RMS DS = 25 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.62	0.69	0.1	0
Power [dB]	0	-15.7	-21.5	-23.9	-
K-factor [dB]	15	0	0	0	-
RMS AS [degree]	11	63	45	17	-

Model.4 (RMS DS = 40 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.8	0.75	0.5	0.1
Power [dB]	0	-16.7	-19.8	-22.7	-21.9
K-factor [dB]	14	0	0	-1	3
RMS AS [degree]	11	63	48	17	25

This page contains the model parameters for radio scenario BS-RS-NLOS, Fc: 5GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.49	0.35	0.13	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.91	0.8	0.62	0.44	0.3	0.18	0.08	0.04	0.02	0.01	0	0
Power [dB]	0	-8.1	-10.9	-14.7	-17.1	-18.3	-19.6	-20.5	-20.8	-21.3	-21.8	-	-
K-factor [dB]	8	3	3	4	5	5	5	6	7	7	8	-	-
RMS AS [degree]	7	19	16	13	10	7	5	3	2	2	1	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.91	0.81	0.81	0.82	0.74	0.57	0.37	0.22	0.13	0.06	0.02	0
Power [dB]	0	-10	-7.6	-6.5	-7.8	-10	-12.8	-14.6	-15.6	-16.4	-16.5	-17.6	-
K-factor [dB]	10	3	3	4	4	5	5	6	6	6	7	11	-
RMS AS [degree]	5	23	19	14	11	9	7	5	3	2	1	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.94	0.71	0.7	0.76	0.83	0.85	0.72	0.51	0.32	0.16	0.06	0.02
Power [dB]	0	-12.2	-11.2	-12	-9.4	-5.8	-6.5	-9.4	-11.6	-13	-14	-15.6	-17.2
K-factor [dB]	11	4	4	3	4	5	5	5	6	7	8	8	18
RMS AS [degree]	4	20	20	18	13	9	6	5	3	2	2	1	0

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.95	0.63	0.54	0.54	0.57	0.7	0.8	0.89	0.77	0.46	0.19	0.05
Power [dB]	0	-13.2	-12.7	-13.8	-14	-13.8	-12	-5.2	-4.7	-7.6	-10.3	-13.8	-13.5
K-factor [dB]	11	4	3	4	4	4	4	5	6	7	8	8	19
RMS AS [degree]	4	18	20	17	14	12	8	4	3	2	2	1	0

This page contains the model parameters for radio scenario RS-RS-LOS, Fc: 5GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	5	15	25	40
Probability [%]	0.41	0.53	0.05	0
Model #	1	2	3	-

Model.1 (RMS DS = 5 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.73	0	0
Power [dB]	0	-18.5	-	-
K-factor [dB]	16	3	-	-
RMS AS [degree]	5	31	-	-

Model.2 (RMS DS = 15 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.88	0.03	0
Power [dB]	0	-17.6	-23.7	-
K-factor [dB]	18	1	-1	-
RMS AS [degree]	6	49	26	-

Model.3 (RMS DS = 25 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.75	0.67	0.08
Power [dB]	0	-16.3	-20.7	-24.6
K-factor [dB]	18	1	0	3
RMS AS [degree]	7	68	14	6

This page contains the model parameters for radio scenario RS-RS-NLOS, Fc: 5GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.56	0.33	0.09	0.02
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.92	0.82	0.64	0.44	0.28	0.15	0.07	0.03	0.01	0.01	0	0
Power [dB]	0	-6.2	-8.4	-13.8	-15.7	-17.5	-18.8	-19.5	-19.8	-20.2	-20.7	-	-
K-factor [dB]	8	3	4	4	5	6	6	5	5	5	4	-	-
RMS AS [degree]	4	11	10	8	6	4	3	2	2	1	1	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.92	0.85	0.85	0.84	0.74	0.54	0.32	0.18	0.09	0.04	0.01	0
Power [dB]	0	-8.2	-5.8	-5.9	-6.9	-9.4	-12.6	-14.3	-15	-16.4	-17.2	-17.4	-
K-factor [dB]	10	3	3	4	5	5	6	6	7	6	7	10	-
RMS AS [degree]	3	12	11	9	6	5	4	3	2	2	2	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.95	0.74	0.71	0.78	0.82	0.84	0.7	0.45	0.27	0.13	0.04	0.01
Power [dB]	0	-10.7	-10.6	-12.6	-9.1	-4.8	-6.4	-10	-10.2	-12.8	-15.7	-14.6	-16.8
K-factor [dB]	12	3	3	4	4	5	6	6	6	6	6	10	10
RMS AS [degree]	2	11	13	13	8	4	3	3	2	2	2	1	0

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.96	0.69	0.62	0.58	0.52	0.72	0.85	0.92	0.75	0.42	0.14	0.03
Power [dB]	0	-11.3	-12.4	-14.6	-14.2	-15.8	-11.9	-3.5	-4.6	-8.9	-11.9	-14.4	-20.3
K-factor [dB]	12	3	3	4	4	5	5	5	7	6	6	9	10
RMS AS [degree]	2	10	14	14	10	8	5	2	2	1	1	1	1

This page contains the model parameters for radio scenario MS-MS-LOS, Fc: 5GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	5	15	25	40
Probability [%]	0.5	0.41	0.05	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 5 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.8	0.26	0.01	0
Power [dB]	0	-18	-11	-16.2	-
K-factor [dB]	16	2	5	4	-
RMS AS [degree]	5	32	25	27	-

Model.2 (RMS DS = 15 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.87	0.16	0.08	0
Power [dB]	0	-17.6	-20.5	-15.3	-
K-factor [dB]	16	1	2	2	-
RMS AS [degree]	6	43	26	24	-

Model.3 (RMS DS = 25 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.89	0.58	0.11	0
Power [dB]	0	-17.4	-21.8	-24.3	-
K-factor [dB]	20	1	0	-1	-
RMS AS [degree]	4	44	35	22	-

Model.4 (RMS DS = 40 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.75	0.58	0.33	0.25
Power [dB]	0	-17.2	-17.9	-21.9	-22.7
K-factor [dB]	15	2	1	-2	5
RMS AS [degree]	11	41	13	9	5

This page contains the model parameters for radio scenario MS-MS-NLOS, Fc: 5GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.6	0.31	0.07	0.01
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.93	0.84	0.65	0.44	0.28	0.13	0.06	0.03	0.01	0	0	0
Power [dB]	0	-4.4	-6.7	-12.4	-14.7	-16.4	-18	-18.6	-19.3	-19	-	-	-
K-factor [dB]	7	3	4	4	5	6	8	6	7	5	-	-	-
RMS AS [degree]	5	11	9	7	5	3	2	2	2	1	-	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.93	0.86	0.86	0.85	0.73	0.51	0.3	0.16	0.08	0.03	0.01	0
Power [dB]	0	-6.9	-4.8	-5.3	-6.2	-9.4	-12.3	-14	-14.7	-15.8	-16.7	-17.5	-
K-factor [dB]	9	3	3	3	5	5	7	6	7	7	8	10	-
RMS AS [degree]	3	11	11	8	6	4	3	2	2	1	1	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.95	0.77	0.72	0.76	0.81	0.85	0.7	0.45	0.26	0.11	0.03	0.01
Power [dB]	0	-8.7	-9.4	-11.7	-8.3	-5.1	-6	-8.5	-9.5	-13.1	-15.2	-16.1	-13.7
K-factor [dB]	10	3	3	3	5	6	7	6	8	7	5	9	12
RMS AS [degree]	3	11	13	12	7	4	3	2	2	1	1	1	0

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.97	0.69	0.57	0.47	0.47	0.74	0.85	0.9	0.76	0.36	0.13	0.03
Power [dB]	0	-10.2	-10.8	-14.2	-14.5	-15.4	-13.7	-3.6	-4.4	-10.4	-8.7	-17	-18.7
K-factor [dB]	11	4	4	4	3	4	5	6	8	7	8	9	13
RMS AS [degree]	2	8	14	14	10	7	4	2	1	1	1	1	1

This page contains the model parameters for radio scenario BS-MS-LOS, Fc: 5GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	5	15	25	40
Probability [%]	0.21	0.62	0.12	0.04
Model #	1	2	3	4

Model.1 (RMS DS = 5 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.74	0	0	0
Power [dB]	0	-18.6	-	-	-
K-factor [dB]	17	4	-	-	-
RMS AS [degree]	4	31	-	-	-

Model.2 (RMS DS = 15 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.81	0.2	0	0
Power [dB]	0	-17.1	-24	-	-
K-factor [dB]	18	0	-3	-	-
RMS AS [degree]	8	54	52	-	-

Model.3 (RMS DS = 25 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.89	0.72	0.06	0
Power [dB]	0	-16.2	-22.4	-23.8	-
K-factor [dB]	18	-1	-4	-6	-
RMS AS [degree]	8	60	53	15	-

Model.4 (RMS DS = 40 ns)

Tap #	1	2	3	4	5
Active Probability [%]	1	0.69	0.85	0.46	0.08
Power [dB]	0	-14.3	-18.1	-21.9	-24
K-factor [dB]	17	-1	0	-2	3
RMS AS [degree]	10	69	36	36	5

This page contains the model parameters for radio scenario BS-MS-NLOS, Fc: 5GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.52	0.34	0.11	0.03
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.92	0.82	0.62	0.42	0.28	0.16	0.07	0.04	0.02	0.01	0	0
Power [dB]	0	-6.5	-9.9	-14	-16.6	-18	-19.2	-20	-20.1	-20.7	-21.1	-	-
K-factor [dB]	8	3	4	4	5	5	5	6	7	6	7	-	-
RMS AS [degree]	10	21	17	13	10	7	5	3	2	2	1	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.91	0.82	0.82	0.82	0.74	0.56	0.35	0.21	0.11	0.05	0.02	0.01
Power [dB]	0	-8.7	-7.1	-6	-7.3	-9.6	-12.7	-14.2	-15.5	-16.3	-16.8	-17.3	-17.4
K-factor [dB]	10	3	3	4	5	5	5	6	7	7	8	10	19
RMS AS [degree]	7	24	19	14	10	8	6	4	3	2	1	1	0

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.94	0.71	0.69	0.76	0.83	0.86	0.72	0.5	0.31	0.15	0.05	0.01
Power [dB]	0	-10.9	-11.2	-11.9	-9.1	-5.4	-6.2	-9.3	-11	-12.7	-14.2	-15.7	-15.7
K-factor [dB]	10	4	3	3	4	5	5	6	6	7	9	10	20
RMS AS [degree]	5	21	21	18	13	8	6	4	3	2	1	1	0

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.94	0.63	0.54	0.54	0.57	0.69	0.79	0.86	0.76	0.43	0.19	0.05
Power [dB]	0	-13.2	-12.9	-14.5	-15.3	-14.7	-11.9	-5.1	-5.3	-8.9	-10	-12.1	-16.1
K-factor [dB]	10	4	4	5	4	4	5	6	7	7	7	10	15
RMS AS [degree]	5	17	20	16	13	12	7	4	2	2	2	1	0

This page contains the model parameters for radio scenario RS-MS-LOS, Fc: 5GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	5	15	25	40
Probability [%]	0.45	0.51	0.05	0
Model #	1	2	3	-

Model.1 (RMS DS = 5 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.8	0	0
Power [dB]	0	-18.4	-	-
K-factor [dB]	17	3	-	-
RMS AS [degree]	5	34	-	-

Model.2 (RMS DS = 15 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.88	0.03	0
Power [dB]	0	-17.5	-24	-
K-factor [dB]	17	1	2	-
RMS AS [degree]	7	55	27	-

Model.3 (RMS DS = 25 ns)

Tap #	1	2	3	4
Active Probability [%]	1	0.82	0.55	0.09
Power [dB]	0	-17.5	-20.9	-23
K-factor [dB]	17	1	1	4
RMS AS [degree]	5	52	24	6

This page contains the model parameters for radio scenario RS-MS-NLOS, Fc: 5GHz, Wc: 10MHz

RMS DS PDF

RMS DS [ns]	50	150	250	350
Probability [%]	0.58	0.32	0.08	0.01
Model #	1	2	3	4

Model.1 (RMS DS = 50 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.93	0.83	0.64	0.43	0.27	0.14	0.06	0.03	0.01	0	0	0
Power [dB]	0	-5.5	-8	-13.6	-15.7	-17.4	-18.6	-19.3	-19.9	-20	-	-	-
K-factor [dB]	7	3	4	4	5	5	6	5	5	5	-	-	-
RMS AS [degree]	6	14	12	9	6	4	3	2	2	2	-	-	-

Model.2 (RMS DS = 150 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.93	0.85	0.85	0.85	0.74	0.53	0.31	0.17	0.08	0.04	0.01	0
Power [dB]	0	-7.4	-5.3	-5.5	-6.5	-9.3	-12.6	-13.9	-14.9	-15.9	-17.1	-16.7	-
K-factor [dB]	10	3	3	4	5	5	6	6	7	7	7	10	-
RMS AS [degree]	4	15	14	10	7	5	4	3	2	2	2	1	-

Model.3 (RMS DS = 250 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.94	0.74	0.7	0.78	0.82	0.85	0.69	0.42	0.25	0.13	0.04	0.01
Power [dB]	0	-10.3	-10.8	-13.1	-8.7	-4.4	-5.9	-9.7	-10.4	-12.7	-14.5	-15.1	-11.7
K-factor [dB]	11	3	3	3	4	5	6	5	7	7	6	11	11
RMS AS [degree]	3	14	16	16	9	4	3	3	2	2	2	1	0

Model.4 (RMS DS = 350 ns)

Tap #	1	2	3	4	5	6	7	8	9	10	11	12	13
Active Probability [%]	1	0.97	0.69	0.54	0.49	0.48	0.7	0.89	0.93	0.74	0.38	0.12	0.02
Power [dB]	0	-10.9	-12.6	-14.2	-13.7	-16.4	-11.7	-3.9	-4.7	-9.2	-12.1	-17.1	-20.1
K-factor [dB]	11	3	3	5	4	5	5	6	6	6	6	8	19
RMS AS [degree]	3	13	18	17	9	8	3	2	1	1	1	1	0