



# LTE Radio Network Design

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## LTE Radio Network Design

Overall Picture

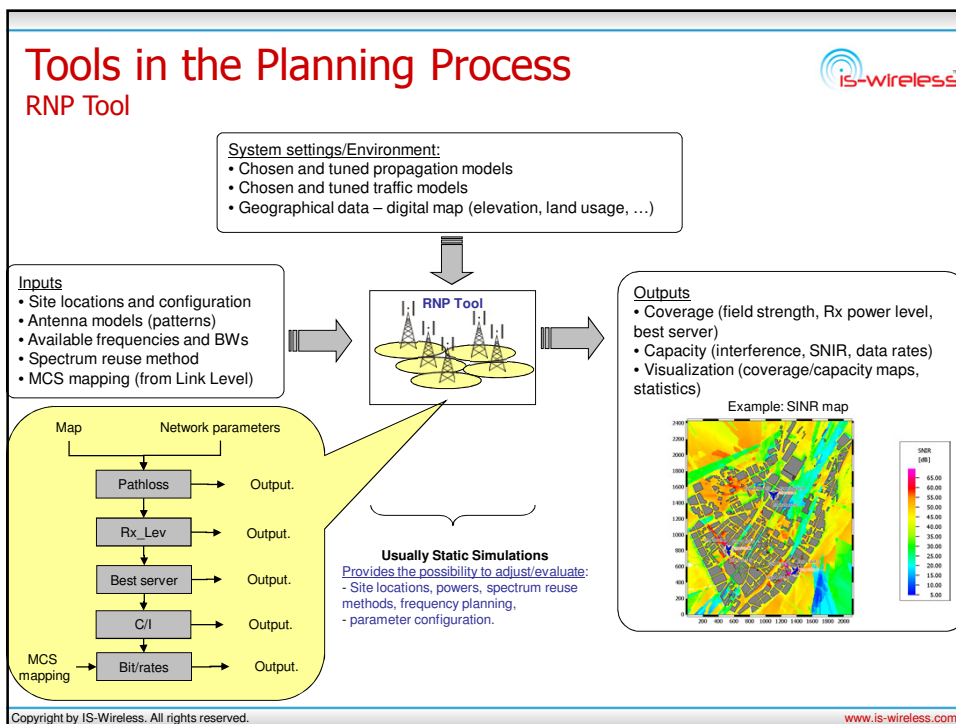
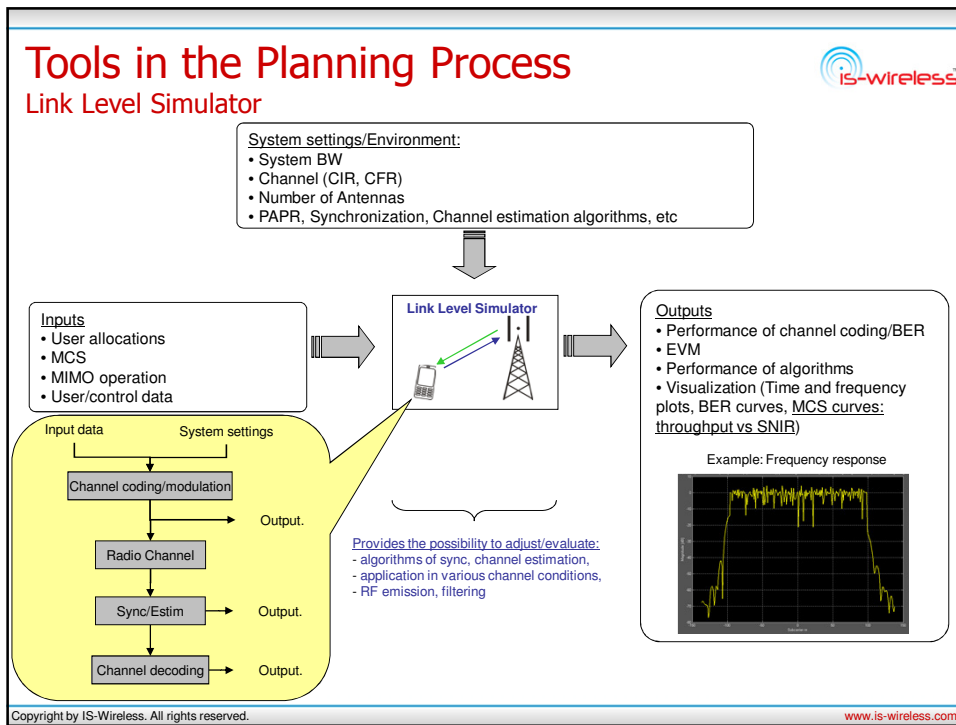


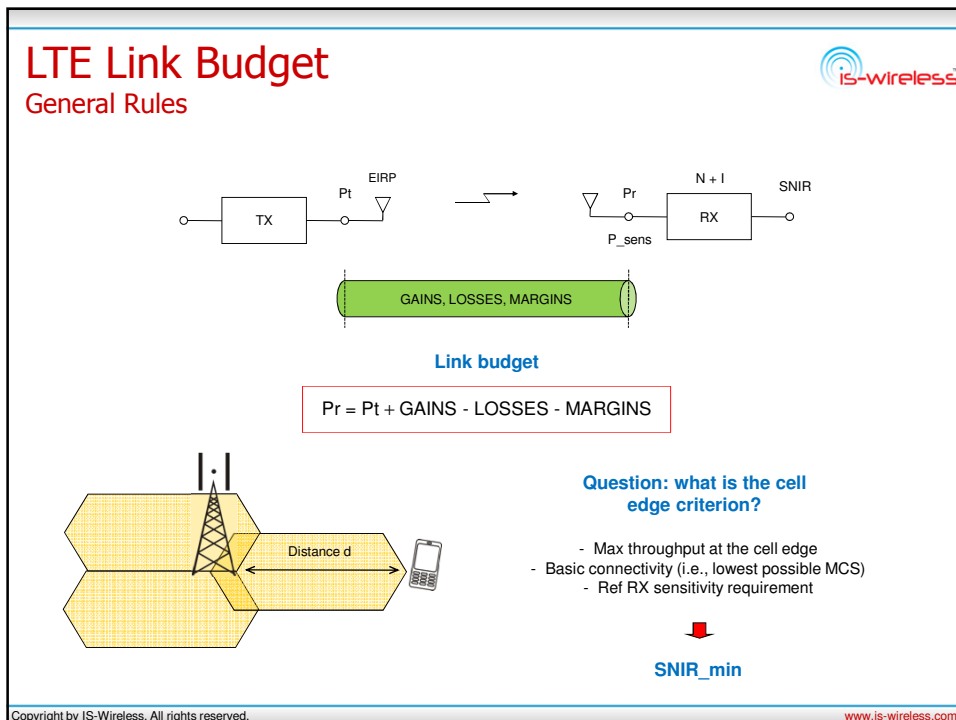
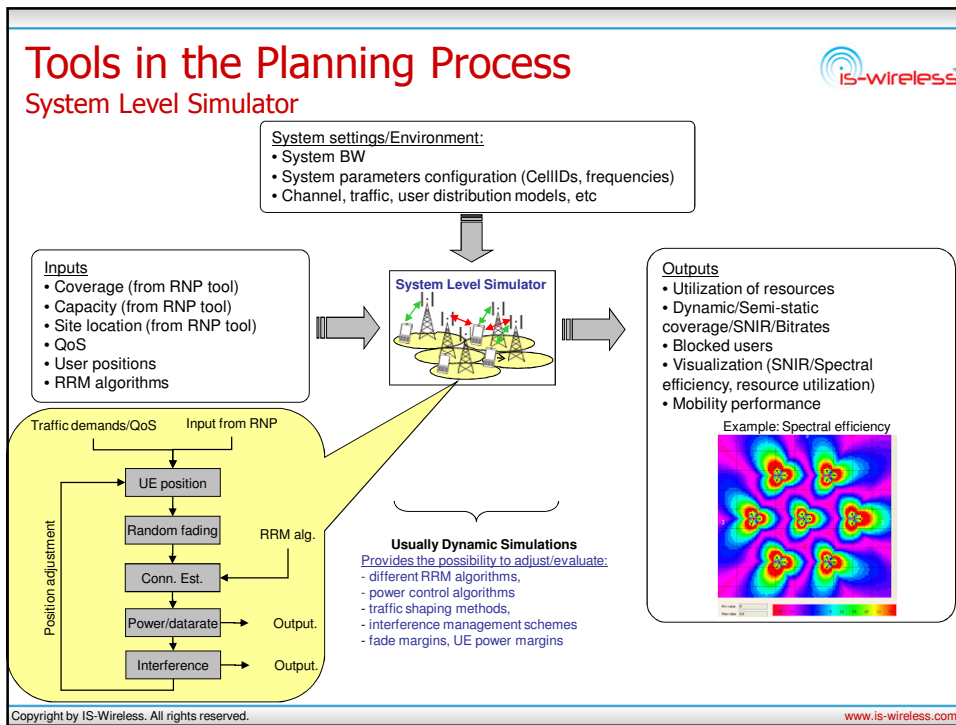
Our scope of interest

```
graph TD; S1[Step 1: Initial planning] <--> S2[Step 2: Detailed planning]; S2 <--> S3[Step 3: Parameter planning]; S3 <--> S4[Step 4: Verification and acceptance]; S4 <--> S5[Roll-out / network optimization / extension];
```

The diagram illustrates the overall picture of LTE Radio Network Design. It consists of five main stages arranged vertically. The first four stages are grouped together by a dashed-line box and labeled 'Our scope of interest'. These stages are: Step 1: Initial planning, Step 2: Detailed planning, Step 3: Parameter planning, and Step 4: Verification and acceptance. Each stage is connected to the next by a pair of arrows pointing in opposite directions (one up, one down), indicating a bidirectional relationship. The fifth stage, 'Roll-out / network optimization / extension', is positioned below the dashed box and is also connected to Step 4 by a pair of bidirectional arrows. The stages are represented by rectangular boxes of varying shades of gray, with Step 1 being the darkest and Step 4 being the lightest. The 'Roll-out' stage is a white box with a gray border.


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## LTE Link Budget

Example Link Budget in Downlink




	Parameter	Value	Comment	
A	Max eNB TX power	46 dBm		}
B	Cable loss	3 dB		
C	CP loss	1 dB		
D	eNB antenna gain max	19 dBi		
E	EIRP max	61 dBm	= A - B - C + D	
	BW_RX	1.8 MHz		}
F	Noise power	-102 dBm		
G	SNIR_min	5 dB	From MCS tables	
H	UE antenna gain	0 dBi		
I	Min required RX power	-97 dBm	= F + G - H	
J	total path loss	158 dBm	= E - I	
K	Other gains, losses, margins	- 10 dB	Shadowing, fast fading, multiantenna	
L	Maximum Allowed Propagation Loss	148 dBm	= J + K	
	Cell range	3.5 km		

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## LTE Coverage

Site Coverage Area and Inter-Site Distance



After determination of cell range (radius) d  
we can estimate the site coverage area

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*	Omni	2-sectors	3-sectors
Site_area	$2.6 * d^2$	$1.3 * d^2$	$1.95 * d^2$
Intersite_distance	$0.87 * d$	$2 * d$	$1.5 * d$

↓

#sites = deployment\_area / site\_area

↓

GRID  
to be entered into the RF Planning tool for verification

\* Source: J. Laiho, A. Wacker, T. Novosad, „Radio Network Planning and Optimization for UMTS“, Wiley, 2002, pp 83

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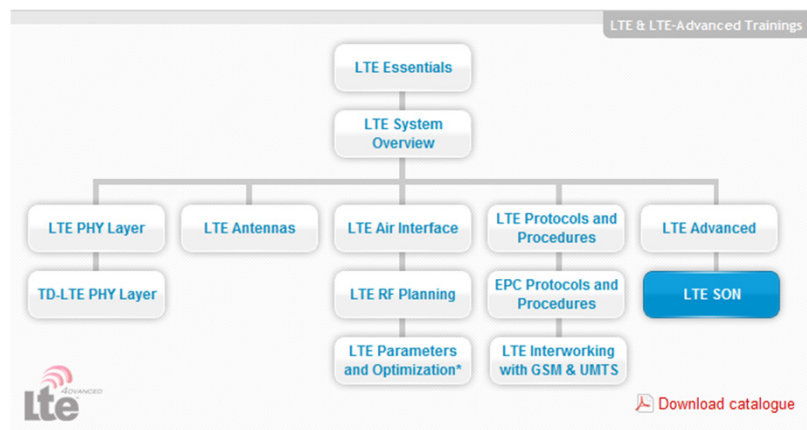
# Backup slides

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