

TOWER and RI Super Antennas, Coverage and Capacity

Doc 336

p1

Coverage, combination of Tower and RI Antenna System

A comparison between standard antennas and RI SAS Antenna Systems illustrates the difference in coverage characteristics. The comparison used is percent of transmitted power received versus distance from antenna

	<u>0-2km</u>	<u>2-5km</u>	<u>5-20km</u>	<u>above horizon</u>	
Standard antenna (8 *1 dipoles)	60%	10%	3%	27%	
RI antenna system (64*4 dipoles)	8%	36%	33%	23%	(Robin Hood principle)

RI antenna system solves the issues of Coverage, Data Rate, Capacity and Profitability per site.

In a typical network 20% of the sites are capacity and DR limited, while the remaining 80% are coverage and DR limited. Upgrading the best sites and significantly increase signal and capacity dramatically improves financial parameters. Available to any and all Operators, including all future frequency bands.

Capacity, combination of Tower and RI Antenna System

Horizontal increase from 1 dipole to 4 dipoles, increase the number of sectors from 3 to 18. Traffic capacity per site is increased 6 times. Available to any and all Operators. Plus physical capacity to host hundreds of modular antenna panels and hundreds of TRX MIMO4/8 when needed.

	<u>Relative capacity</u>	<u>Gain</u>
Standard antenna (8 dipoles*1)	100%	56 (17.5 dBi)
RI antenna system (64 dipoles*4)	600%	1 600 (32 dBi)

TOWER and RI Super Antennas, Spectrum Efficiency, Energy and Figure of Merit

Doc 336

Spectrum efficiency, 4-8 times improved, average and minimum Data Rates 3-12 times improved

p2

The Site Hotel; Tower, RI Antenna System, lobe shapers/cables/feeders/multiplexer combinations improve spectrum efficiency 4-8 times beyond LTE with standard antennas with MIMO4/8.

The Site Hotel; Creates virtual spectrum to any and all Operators, 4-8 times more than what is available today, without spectrum auctions. Delivered average and minimum data rates and traffic per TRX is further improved 3-12 times, due to the 10-15 dB improved signal at the fringes achieved with the Robin Hood effect.

Energy consumption, nationwide

The RI SAS antennas consume no power, instead increase signal 10-100 times to where it is really needed. Energy consumption per km² and GB is reduced by more than 90%. Enabling 100% green sites with wind- and solar power to feed any and all Operator RRH's. Nationwide will reduce CO2 emission equivalent to one coal powered plant or one nuclear power plant.

Figure of Merit of RI SAS antennas in tower

RI antenna system in a tower has a very high figure of merit (F/M) and efficiency with given Tower Loading Capacity. RI antenna system F/M is 40-72 times higher and more efficient than standard antennas and any active antennas. Delivering multiplied Coverage area, Data Rate and Capacity, from most existing towers. The RI antenna system supports 12-18 sectors with MIMO4/8 for all frequency bands and to any and all Operators, and hundreds of RRH8 modules all protected behind the antennas.

(note: $F/M = G_x * TRX_{qty} / EPA_{tot}$; EPA = Equivalent Projected Wind Area)

TOWER and RI Super Antennas, Financial Parameters

Doc 336

	Standard Antennas	RI SAS Antenna System	p3
Operators supported	1 – 4 ?	8 – 12	
Frequency bands supported	5 ?	5 + future proof	
Revenue per site per annum	\$25 000 100%	\$300 000 12 000%	
Capex per site Ph ₀	\$130 00 100%	\$260 000 200%	
Capex per km ² covered	\$1 300 100%	\$130 10%	
ROI of tower + antennas	<20%	>100%	
Cost to provide mobile broadband, 350 Mb/s for 100% POP coverage and 150 GB/cust/mnth	extremely high	very low	
Time to deploy	long	very rapid using existing towers	
Global leadership in KPIs and QoS	NO	YES	

TOWER and RI Super Antennas, All will benefit

Doc 336

NEUTRAL

p4

Service in all frequency bands, 380 MHz-3 800 MHz, expansion room for new bands up to 6 GHz
Support for all standards GSM/EDGE, CDMA, UMTS, HSDPA, HSDPA+, LTE, LTE+, WiMax, ..
Support to any and all Operators, with Capacity for all bands and gradual expansions
Support for RRH equipment from all Vendors. Antennas are 100% passive, no electronics or power.

IMPROVEMENTS to ALL

Tower and Antenna owner is offering far superior Coverage, much higher DR and Capacity, at much lower cost
Tower and Antenna owner dramatically increases spectrum efficiency and delivered Data Rates to all customers
Tower and Antenna owner dramatically reduces energy consumption and hence CO2 emission
Tower and Antenna owner supports any and all Operators who offer a much better QoS to all the end-users; rural, sub-urban and urban.

NATIONAL and SOCIAL BENEFITS

All consumers choose services from all providers, stimulating society and GDP growth
Mobile broadband to all citizens, all in rural areas, in sub-urban areas and in urban areas, no one left behind
Lowest possible cost to build, operate and deliver to all citizens nationwide indoor mobile data rates
Lowest possible energy consumption and CO2 emission to operate
Fastest possible time to deploy to all citizens. Will become the first nation globally to deliver more than 350 Mb/s and 150GB /cust/mth to 100% of the population.

