Whitepaper
System Gain with Transcend™ 800

Transmission solution for a low total cost of ownership

Transcend™ 800 Indoor Unit (IDU)

The Advantech Wireless Transcend™ 800 product has the best system gain on the market. With this system gain, you save investment and running costs by allowing for smaller antennas, higher connection availability and/or longer connections. By using smaller antennas, you save costs on lower installation costs, lower mast rent and lower costs for antennas.

Advantech was not only the first supplier to manufacture a native Ethernet radio, we were also the first supplier to implement LDPC error-correction mechanism in our split-mount microwave radio product in the early 2000's. Since then, we have improved our design in our Transcend™ 800 and achieved an extremely performing system gain. In general, our customers measured a system gain 5 to 10 dB stronger than most leading competitors.

System gain is defined as the difference between the transmitted output power and the receiver threshold. It is a measure of how much the transmitted signal can be attenuated before the connection is lost. The system gain value defines the maximum length of a connection.

Since the propagation of radio waves are affected by environmental factors like rain intensity, terrain and climatic factors, the connection is planned towards a percentage of time which the connection should be statistically available. The most demanding availability goal used for radio planning is 99,999% which can easily be achieved using Transcend™ 800. A lower value gives a lower quality of the transmission but extra distance, smaller antenna.

A few simple rules for how the transmission frequency is affected by environmental factors are:

- The higher the frequency, the higher the attenuation of rain.
- The lower the frequency, the higher the attenuation from ground reflections.

Key Features/Benefits

The outstanding system gain of the Advantech Wireless Transcend™ product allows for:

- Lower investment in hardware since smaller and less expensive antennas are used
- Lower installation costs
- Lower mast rent or less expensive masts
- Longer connections and/or higher availability over the connections.
- Fewer frequencies needed in the network since the system gain allows for longer hops at higher frequencies.

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Technical Data

The following tables show the typical hop lengths achieved using our Advantech Wireless Transcend™ 800. Availabilities were taken from Pathloss' Annual Multipath + Rain figures, based on rain zone E (22 mm/h), 28 MHz bandwidth, continental temperature climates or mid-latitude inland climatic regions with average rolling terrain, terrain factor 22 m, link availability of 99.999%.

7GHz equipment

Modulation	Antenna Size	Distance
QPSK	0.6 m	47 Km
QPSK	1.2 m	82 Km
QPSK	1.8 m	> 100 Km
16QAM	0.6 m	34 Km
16QAM	1.2 m	59 Km
16QAM	1.8 m	83 Km
256QAM	0.6 m	16 Km
256QAM	1.2 m	28 Km
256QAM	1.8 m	39 Km

18GHz equipment

Modulation	Antenna Size	Distance
QPSK	0.6 m	23 Km
QPSK	1.2 m	33 Km
QPSK	1.8 m	40 Km
16QAM	0.6 m	17 Km
16QAM	1.2 m	25 Km
16QAM	1.8 m	30 Km
256QAM	0.6 m	11 Km
256QAM	1.2 m	16 Km
256QAM	1.8 m	20 Km

Typical System Gain of the Advantech Transcend 800

ETSI channel bandwidths

Frequency Band: 7 GHz				Frequency Band: 18 GHz			
Modulation	QPSK	16QAM	256QAM	**Modulation**	QPSK	16QAM	256QAM
1.75 MHz	130.7 dB	123.2 dB	106.8 dB	**1.75 MHz**	126.7 dB	117.7 dB	100.3 dB
3.5 MHz	127.7 dB	120.2 dB	103.8 dB	**3.5 MHz**	123.7 dB	114.7 dB	97.3 dB
28 MHz	118.6 dB	111.2 dB	94.5 dB	**28 MHz**	114.6 dB	105.7 dB	88.0 dB
56 MHz	115.6 dB	108.2 dB	91.3 dB	**56 MHz**	111.6 dB	102.7 dB	84.6 dB

FCC channel bandwidths

Frequency Band: 6 GHz				Frequency Band: 18 GHz			
Modulation	QPSK	16QAM	256QAM	**Modulation**	QPSK	16QAM	256QAM
2.5 MHz	129.1 dB	121.7 dB	105.2 dB	**5 MHz**	122.1 dB	113.2 dB	95.7 dB
3.75 MHz	127.4 dB	119.9 dB	103.5 dB	**10 MHz**	119.1 dB	110.2 dB	92.7 dB
5 MHz	126.1 dB	118.7 dB	102.2 dB	**40 MHz**	113.1 dB	104.1 dB	86.1 dB
10 MHz	123.1 dB	115.7 dB	99.2 dB	**80 MHz**	111.6 dB	102.7 dB	84.6 dB

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