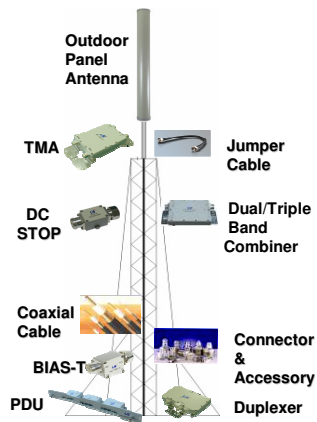


RF Cables and Repeaters

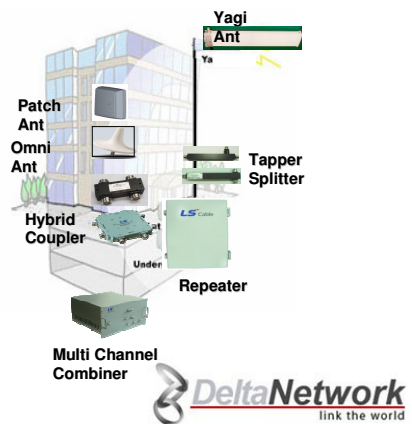


RF Products

Base Station

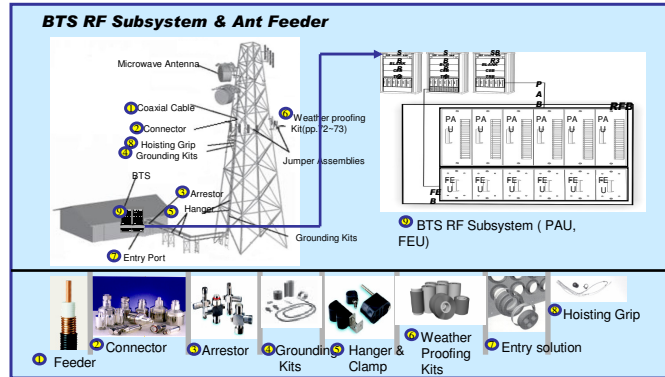


In-Building



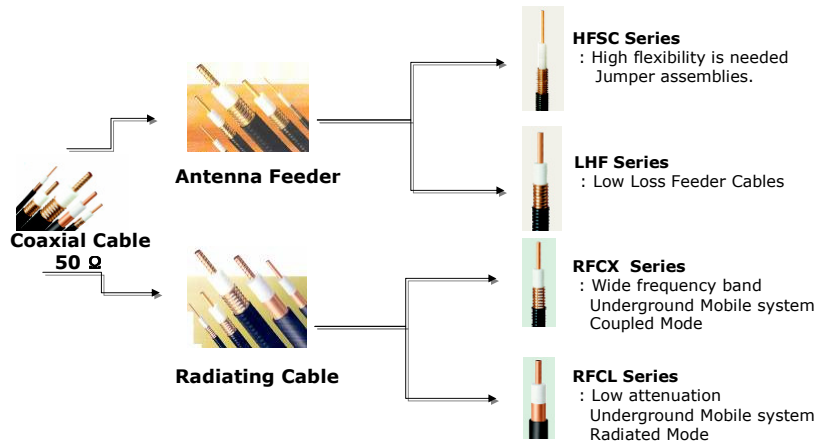
1. Introduction of RF Products

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Wireless Network Solutions



1-1 Feeder Cable

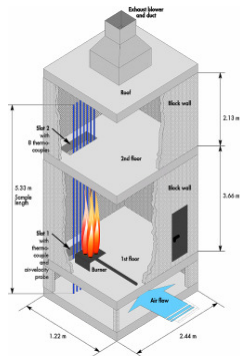
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1-1 Feeder Cable

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➤ Jacket Option



Test Chamber (CMR Test)
According to UL 1666

Standard Jacket Meeting Following Requirements

- IEC 754-1 Halogen acid gas content (Chlorium < 0.5%)
- IEC 754-2 Degree of acidity of gas
(PH-Value > 4.0, Conductivity < 100 us/Cm)

Flame-retardant Meeting Following Requirements

- IEC 754-1 Halogen acid gas content (Chlorium < 0.5%)
- IEC 754-2 Degree of acidity of gas
(PH-Value > 4.0, Conductivity < 100 us/Cm)
- IEC 332-3C Flammability test on cable bundle
- IEEE 383 Flammability test on cable bundle
- IEC 332-1 Flammability test on single cable
- ASTM E 662 Optic density of smoke (smoke-density < 150)

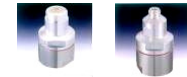


1-2 Connector & Others for Feeder Cable

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Wireless Network Solutions

➤ Connectors & Accessories

1. Connector & Tool



7/16 DIN - Female N - Female



7/16 DIN Male Right Angle

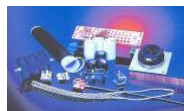


Tools

2. Assembly Jumper



3. Mounting Materials & other Accessories



➤ Features & Benefits

1. Connectors

- Excellent V.S.W.R : 1.08
- Low Intermodulation : -160dBc
- Fast and easy installation : Two Pieces
- Water Protection : IP 68

2. Assembly Jumper

- Excellent V.S.W.R : 1.08
- Low Intermodulation : -160dBc
- Solder : ROHS Compliance
- Water Protection : IP 68
- Compatibility with Other Brands

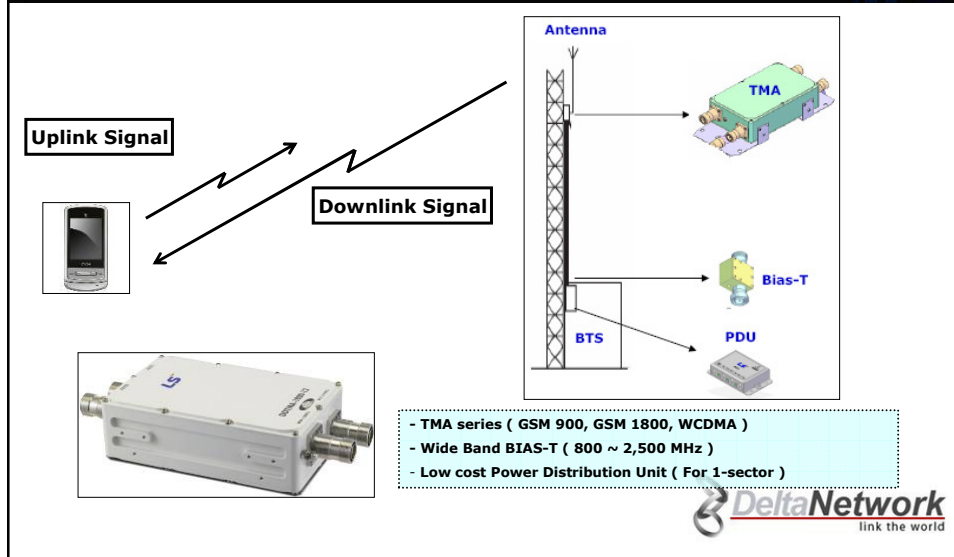
3. Mounting Materials & Other Accessories

- EMP Surge Protection Devices : 4/λ Stub (Wide Band: 800~2,500MHz)
- Dummy Load
- Grounding Kits
- Mounting Hardware – hangers, clamps etc
- Weatherproofing Kits



2. Tower Mounted Amplifier (TMA)

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2-1 Specification of TMA

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Wireless Network Solutions

Tx Path	Specifications
Frequency	1805 - 1880 MHz
Insertion Loss	0.7 dB Max
Input Avg & Peak Power	200W / 2kW
IMD in Rx band	-107 dBm (2x43dBm)
Return Loss	18 dB Min
Rx Path	Specifications
Frequency	1710 - 1785 MHz
Gain	12 ± 1.0 dB
Return Loss	18 dB min (LNA ON) 15 dB min (By-pass mode)
By-pass mode Loss	2.3 dB Max.
Noise Figure	1.7 dB Typ.
Output 1-dB point	15 dBm min
OIP3	28 dBm min
DC Supply	+12V / 110mA Typ.
Alarm Handling	Alarm 1: > 230mA Alarm 2: > 330mA
Environmental & Mechanical Characteristics	
Operating Temp.	-40 ~ +60°C
IP rating	IP67
Lightning Protection	±5kA, 8/20µs
Dimensions (W X D X H) mm	256 X 158 X 96 mm

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3. Repeater

a. Pico Repeater (10mW)

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RF Specifications		
Parameter	Down-link	Up-link
Frequency Range [MHz]	1805 ~ 1880 2110 ~ 2170	1710 ~ 1785 1920 ~ 1980
Gain [dB]	60	57
Output Power [mW]	10	10
Input Range [dBm]	-57 ~ -42	-100 ~ -47
OIP ₃ [dBm]	34 Min	34 Min
Noise Figure [dB]	6 Max	
VSWR	1.5	
Flatness [dB]	± 2 Max	
AGC Range [dB]	20	
Impedance [Ω]	50	
Power Consumption [W]	8 Max	
Dimension [mm]	130 x 155 x 53.5	
Weight [Kg]	2	
Power Supply [V]	AC110 ~ 220 (AC to DC Adaptor)	
Connector Type	SMA female	

■ GSM 1800/3G Pico Repeater



■ Features

- Cost-effective Solution
- Easy and fast installation
- Extending Coverage -> 330m² (Small parking lots, retail store, Hotel room)
- High Performance & Compact Size
- One Body Structure (Antenna Built-In)
- Internal or external service antenna
- AGC (Auto Gain Control)
- Auto Installation and protect oscillation
- EDGE Support



3. Repeater

b. Small Size RF Repeater (50mW)

Your partner in
Wireless Network Solutions

RF Specifications		
Parameter	Down-link (MHz)	Up-link (MHz)
Frequency Range (2G)	1760 ~ 1775 1782.5 ~ 1785	1885 ~ 1870 1877.5 ~ 1880
Frequency Range (3G)	2125 ~ 2135	1935 ~ 1945
Gain [dB] (2G)	70	70
Gain [dB] (3G)	75	75
ALC Range [dB]	30	
Output Power [dBm]	17	17
OIP ₃ [dBm]	36 Min	
Noise Figure [dB]	6 Max	
VSWR	1.5 Max	
Flatness [dB]	± 3	
Spurious Emission [dBm]	-30 Max	
Impedance [Ω]	50	
Power Consumption [W]	30 Max	
Mechanical & Environment Specifications		
Dimension [mm]	302 x 330 x 88	
Weight [Kg]	7	
Power Supply [V]	AC 220 (AC to DC Adaptor)	
Connector Type	N Female	
Temperature [°C]	-10 ~ 55	

■ GSM 1800/3G Small Size Repeater



■ Features

- Cost-effective Solution
- Easy and fast installation
- Application for In Building Distribution System (ex. Shopping Mall, Hotel Lobby)
- High Performance & Compact Size
- ALC (Auto Level Control) & MGC (Manual Gain Control)
- Local & Remote Control (Using GUI, Modem)
- Wireless modem connection (OMC Option)
- EDGE Support



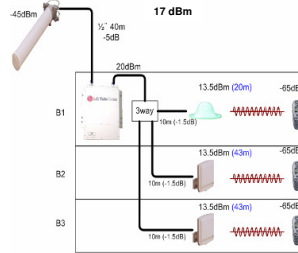
3. Repeater (Small size Repeater)

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Wireless Network Solutions

■ Coverage

- Define : The distance of -65dBm received signal power to mobile handset
- Coverage area: Total 990m² (at GSM1800)
(Beam width 70° patch antenna or Omni antenna)
- Connectable 2~4 service antennas
- Service area is hotel lobby, underground parking lots, shopping malls
- Mobile handset output power lower than 20dBm after call setup
- Set as 20dBm of handset output power for simultaneous calls as below table
- Considered -15dB as barrier loss
- Typically received signal sensitivity of mobile handset is -104dBm (GSM, DCS, CDMA, WCDMA)
- Coverage can be expanded with more service antenna

■ Installation Diagram



Floor	Small Out	3Way Divider	RF Cable	Service ANT	Free Space	Barrier	Input Handset	Service Radius (@ -65dBm)
B1				0dBi	-63.5dB			20m
B2	20dBm	-5dB	-5dB	7dBi	-70.5dB	-15dB	-65dBm	44m
B3				7dBi	-70.5dB			44m

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3. Repeater (Middle Size Repeater)

C. Middle Size RF Repeater (2W)

Your partner in
Wireless Network Solutions

RF Specifications		
Parameter	Down-link (MHz)	Up-link (MHz)
Frequency Range (2G)	1760 ~ 1775 1782.5 ~ 1785	1885 ~ 1870 1877.5 ~ 1880
Frequency Range (3G)	2125 ~ 2135	1935 ~ 1945
Gain [dB]	90	90
ALC Range [dB]	30	
Output Power [dBm]	33	33
OIP ₃ [dBm]	60 Min	
Noise Figure [dB]	6 Max	
VSWR	1.5 Max	
Flatness [dB]	± 3	
Spurious Emission [dBm]	-30 Max	
Impedance [Ω]	50	
Power Consumption [W]	170 Max	
Mechanical & Environment Specifications		
Dimension [mm]	413 x 490 x 153	
Weight [Kg]	22	
Power Supply [V]	AC 220 (AC to DC Adaptor)	
Connector Type	N Female X 2	
Temperature [°C]	-10 ~ 55	

■ GSM 1800/3G Middle Size Repeater (2W)



■ Features

- Cost-effective Solution
- Easy and fast installation
- Application for In Building Distribution System (ex. Large office, Shopping Mall, Hotel Lobby)
- High Performance & Compact Size
- ALC (Auto Level Control) & MGC (Manual Gain Control)
- Local & Remote Control (Using GUI, Modem)
- Wireless modem connection (OMC Option)
- EDGE Support

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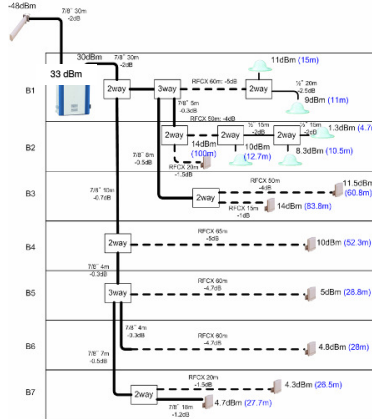
3. Repeater (Middle Size Repeater)

Your partner in
Wireless Network Solutions

■ Coverage

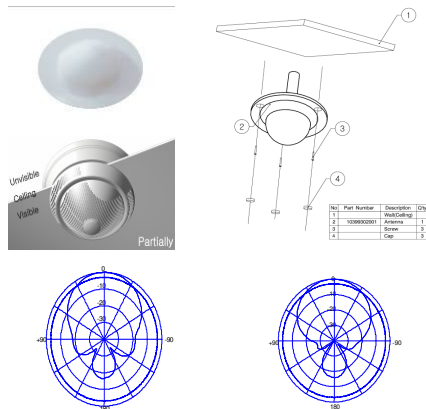
- Define : The distance of -65dBm received signal power to mobile handset
- Coverage area: Total 3300m² (at GSM1800)
(Beam width 70° patch antenna or Omni antenna)
- Connectable 10~20 service antennas
- Service area is underground parking lots, large office, large shopping malls
- Considered -15dB as barrier loss
- Typically received signal sensitivity of mobile handset is -104dBm
(GSM, DCS, CDMA, WCDMA)
- Coverage can be expanded with more service antennas

■ Installation Diagram



4. Antenna (In-building Antenna)

Your partner in
Wireless Network Solutions



■ Features

- Cost-effective Solution
- Easy and fast installation
- The smallest size dual band omni antenna

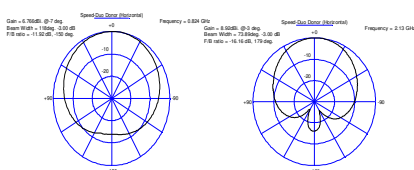
Electrical Specifications	
Frequency Range [MHz]	824 ~ 960 / 1710 ~ 2170
Gain [dBi]	2 Min
Polarization	Vertical
Horizontal Beam width [°]	360
Vertical Beam width [°]	60 ~ 90
Impedance [Ω]	50
VSWR	1.8
Max Power rating[W]	10
Mechanical & Environment Specifications	
Dimension [mm]	Ø 114 * H 50
Weight [g]	500
Connector Type	N- Female *1
Radome	ASA



4. Antenna (In-building Antenna)

Your partner in
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Wide BAND PATCH ANTENNA



Features

- Cost-effective Solution
- Easy and fast installation
- Parking Lot, Hotel Room, Link
- The smallest size dual band patch antenna

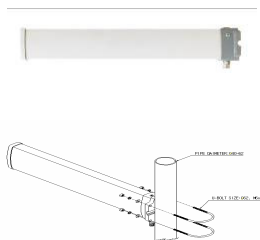
Electrical Specifications	
Frequency Range [MHz]	824 ~ 960 / 1710 ~ 2170
Gain [dBi]	5 / 8
Polarization	Vertical
Horizontal Beam width [°]	85 / 70
Vertical Beam width [°]	70 / 90
Impedance [Ω]	50
VSWR	1.5
Max Power Rating[W]	10
Mechanical & Environment Specifications	
Dimension [mm]	140 * 170 * 46
Weight [g]	250
Connector Type	N- Female *1
Radome	ASA



4. Antenna (In-building Antenna)

Your partner in
Wireless Network Solutions

Wide Band YAGI ANTENNA



Features

- Donor antenna
- compact size
- Cost-effective Solution
- Easy and fast installation
- Link for building
- The smallest size yagi antenna for dual band

Electrical Specifications	
Frequency Range [MHz]	824 ~ 960 / 1920 ~ 2170
Gain [dBi]	5.5 Min / 11.5 Min
Polarization	Vertical
Horizontal Beam width[°]	80 ~ 120 / 40~60
Vertical Beam width [°]	50 ~ 70 / 35 ~ 55
F / B [dB]	7 Min / 15 Min
Impedance [Ω]	50
VSWR	1.8
Max Power Rating [W]	100
Mechanical & Environment Specifications	
Dimension [mm]	100 * 480 * 42
Weight [kg]	1.5
Connector Type	N- Female *1
Radome	ASA



4. Antenna (Outdoor Panel Antenna)

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Wireless Network Solutions

Electrical Specifications	
Frequency Band [MHz]	1710 ~ 2170
Gain [dBi]	17
Polarization [°]	±45
Beam width [°]	Horizontal : 63 ± 6
	Vertical : 7±2
Fixed electrical tilt	0°, 2°, 6°, 8°
V.S.W.R	1.5
Side lobe [dB]	13 Min
F/B ratio [dB]	25 Min
Port isolation [dB]	30 Min
PIMD [dBc]	-150
Max. Input Power [W]	350
Connectors	7/16(DIN) Female
Dimension [mm]	172 * 78 * 1305
Weight [kg]	6.85
Radome	FRP (gray)

■ GSM 1800 / 3G Outdoor Antenna



■ Features

- Outdoor Panel Antenna
- Superior RF Characteristics
- Cost-effective Solution
- Easy and fast installation

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