



*Technical Implementation
and Target Coverage
for WCDMA BTS Booster*

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Product Enquiry & Local support contact sales@pacificwave-wireless.com
Another related component can be found at www.pacificwave-wireless.com



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BTS Booster Overview



Picture of TM-MCPA

Due to rapid changes in wireless network environment, network operators are now faced with various infrastructure solutions and cost issues in upgrading wireless network. HFR's TM-MCPA product provides cost effective capacity/coverage upgrade solution. Sharing of existing RF cable and antenna, and coverage extension are the major advantages of this system. TM-MCPA allows for a complete link budget solution by efficient network infrastructure resource management.

◆ TM-MCPA – Features

- Increase channel count per antenna at the same power level
- Seamless BTS field integration with RF bypass solution
- Tower-Mount feature to maximize output power at the antenna
- Protect from threshold power level, temperature and VSWR

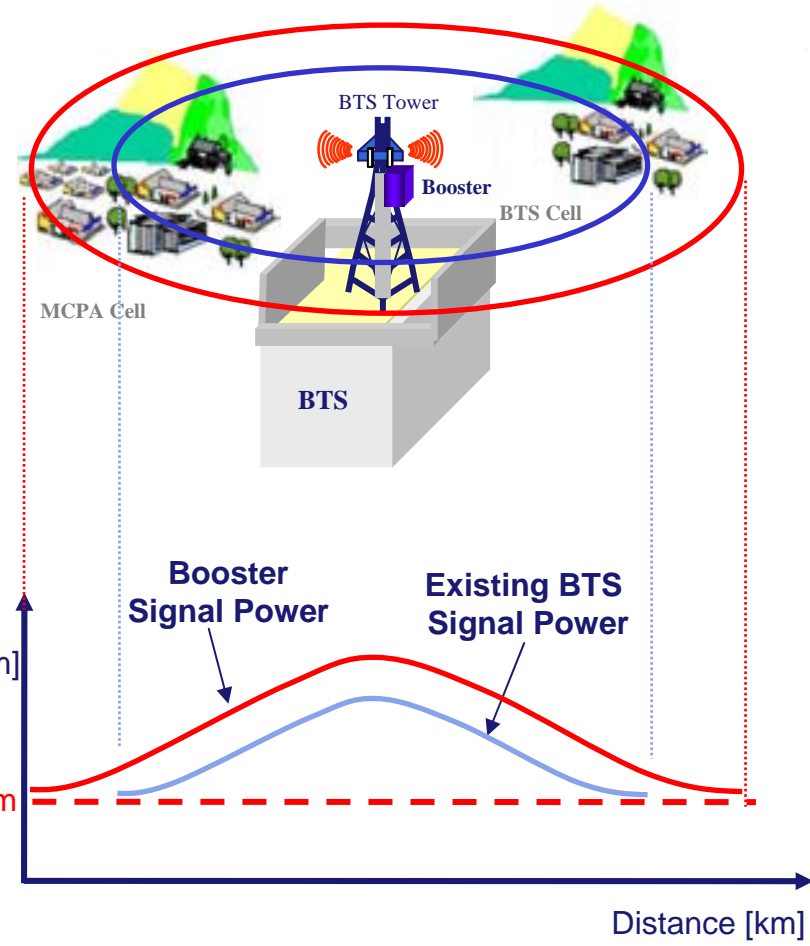
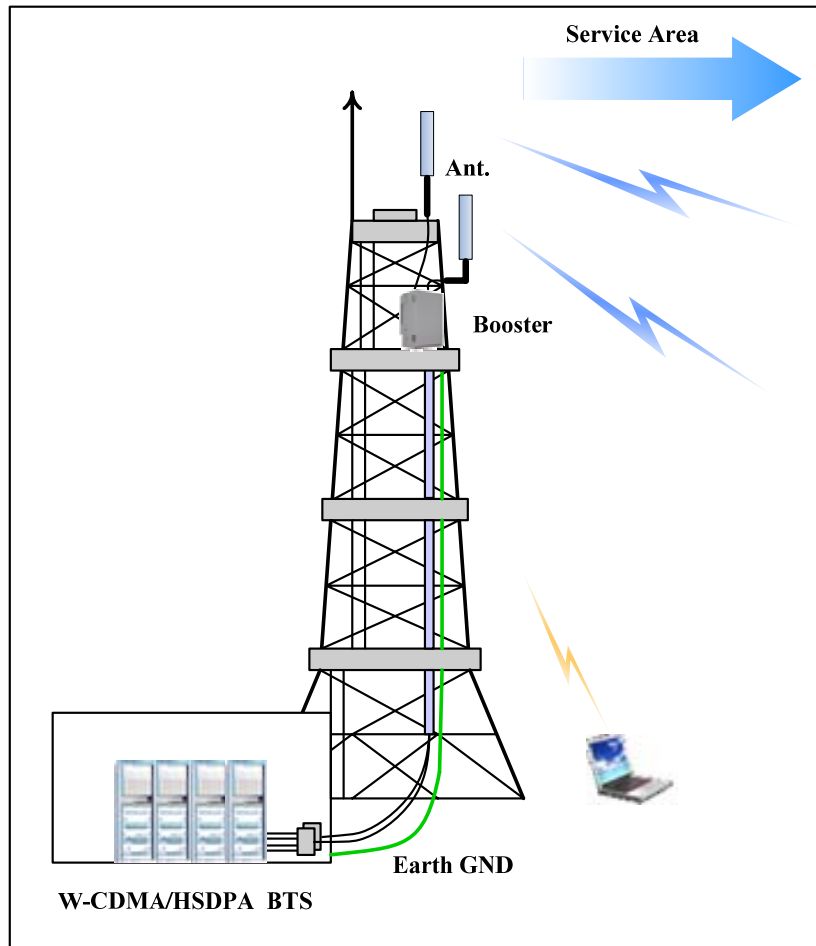
◆ TM-MCPA – Managements

TM-MCPA can be easily monitored and controlled using built-in microprocessor. Following extensive features are included for managing system easily.

- User selectable downlink/uplink RF gain
- Power level monitoring and alarm reporting
- Operation used to SMS modem & RS232/RS485 interface
- Easy setup & maintenance feature



Operation of BTS Booster System



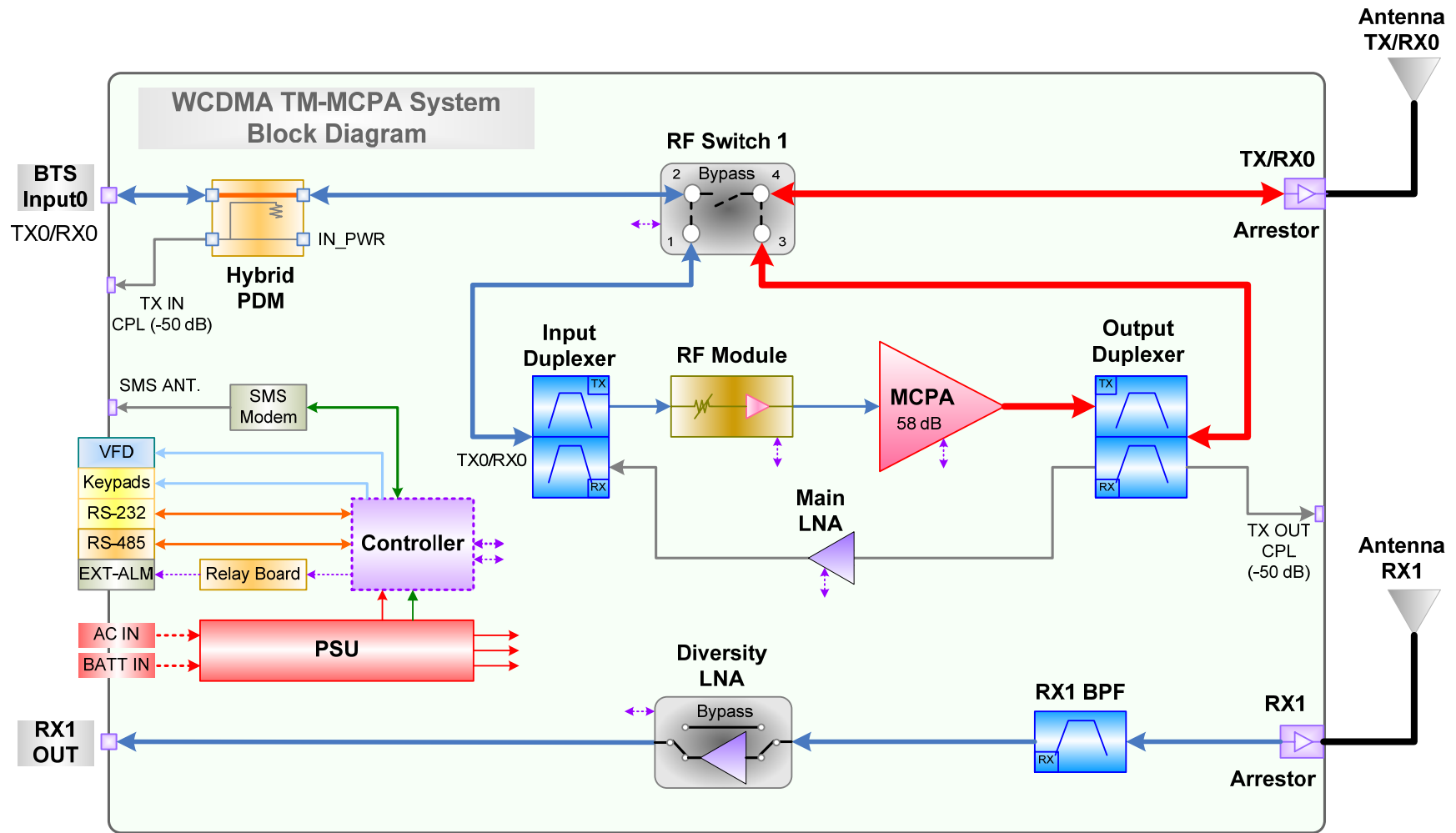
Tower Mounted Type

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Technical Specification

Parameters		Unit	Specifications	Remarks
Frequency Range	TX	MHz	2110 ~ 2170	WCDMA
	RX	MHz	1920 ~ 1980	WCDMA
Instantaneous Bandwidth		MHz	15	WCDMA 3FA
Maximum Output Power	TX	dBm	46	40 W [ALC]
	RX	dBm	-10	
Gain	TX	dB	24 ± 1	
	RX	dB	12 ± 1	Main & Diversity Path
Gain Control Range / Step	TX	dB	24 / 0.5	
	RX	dB	12 / 1.0	
Gain Flatness		dBp-p	≤ 1.0	Over Pass Band
Noise Figure		dB	≤ 2.5	Reverse Main & Diversity Path
Bypass Insertion Loss		dB	≤ 1.5	At Fail Safe Operation Mode
Spectrum Emission Mask			Refer to TS 25.141	
Maximum TX Input Power Without Damage		dBm	46	
Fail Safe Operation			RF Bypass	
TX / RX Isolation		dB	≥ 70	
Operation Temperature		°C	-20 ~ 50	
Environment Application			Indoor / Outdoor	IP65
Power Supply		VAC	220 ± 20%	
Local Control			Keypad / RS232 / RS485	
NMS			SMS Modem	Include External Alarm

System Block Diagram



Field Application – 2 FA / Sector

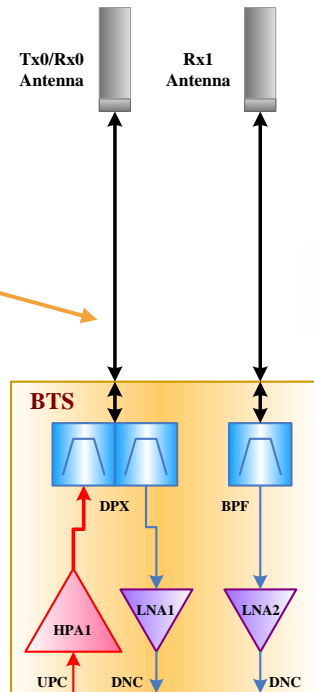
Benefits

- ❖ TX Power : 38 dBm \Rightarrow 43 dBm / FA
- ❖ BTS Sensitivity : -132 dBm \Rightarrow -136 dBm

- TX Power at Antenna = 38 dBm / FA
- RX Sensitivity with Antenna = -132 dBm

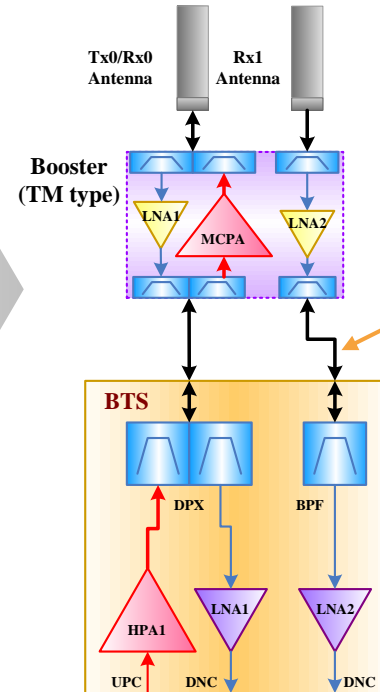
• Cable Loss : 4 dB (60 m)

- LPA Output Power = 43 dBm / FA
- BTS Output Power = 42 dBm / FA
- BTS Sensitivity = -119 dBm



Service Configuration without Booster System

Install Booster



Service Configuration with Booster System

- TX Power at Antenna = 43 dBm / FA
- RX Sensitivity with Antenna = -136 dBm

• Cable Loss : 4 dB (60 m)

- LPA Output Power = 43 dBm / FA
- BTS Output Power = 42 dBm / FA
- BTS Sensitivity = -119 dBm

Field Application – 4 FA / Sector

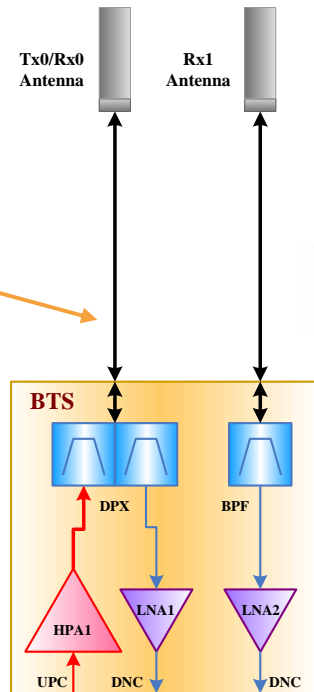
Benefits

- ❖ TX Power : 35 dBm \Rightarrow 40 dBm / FA
- ❖ BTS Sensitivity : -132 dBm \Rightarrow -136 dBm

- TX Power at Antenna = 35 dBm / FA
- RX Sensitivity with Antenna = -132 dBm

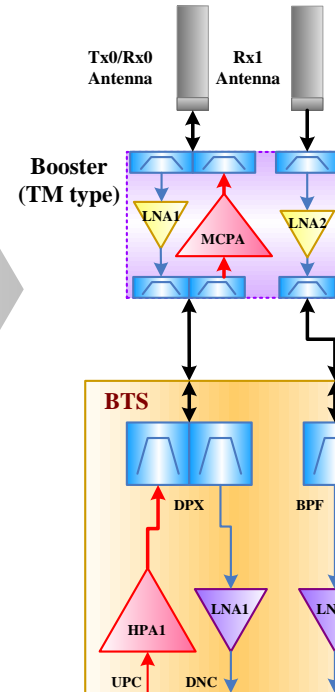
• Cable Loss : 4 dB (60 m)

- LPA Output Power = 40 dBm / FA
- BTS Output Power = 39 dBm / FA
- BTS Sensitivity = -119 dBm



Service Configuration without Booster System

Install Booster



Service Configuration with Booster System

- TX Power at Antenna = 40 dBm / FA
- RX Sensitivity with Antenna = -136 dBm

• Cable Loss : 4 dB (60 m)

- HPA Output Power = 40 dBm / FA
- BTS Output Power = 39 dBm / FA
- BTS Sensitivity = -119 dBm

Target Coverage for Downlink

Link Budget of TX Channels (2 FA)

Parameter	Unit	Value	Equation
Channel Data Rate	kbps	144.00	a
Bandwidth / FA	MHz	3.84	b
BTS TX Output Power / FA	dBm	38.00	c
Booster TX Output Power / FA	dBm	43.00	d
Booster <-> Antenna Cable Loss	dB	0.50	e
BTS <-> Antenna/Booster Cable Loss	dB	4.00	f
BTS/Booster Antenna Gain	dBi	17.00	g
BTS EIRP / FA	dBm	51.00	ii = c - f + g
Booster EIRP / FA	dBm	59.50	jj = d - e + g
UT Antenna Gain	dBi	2.00	k
Thermal Noise	dBm/Hz	-174.00	m
UT RX Noise Figure	dB	6.00	n
RX Noise Power	dBm	-102.16	oo = m + 10log(b) + n
Interference Margin	dB	3.00	p
RX Total Noise Power	dBm	-99.16	qq = oo + p
Processing Gain, 144 kbps	dB	14.26	rr = 10log(b/a)
Required Eb/No	dB	5.50	s
Fast Fade Margin	dB	4.00	t
UT Receiver Sensitivity	dBm	-105.92	uu = qq - rr + s - k + t
Log-normal Fade Margin	dB	7.00	v
Soft-handover Gain	dB	3.00	w
BTS <-> UT Maximum Path Loss	dB	152.92	xx = ii - uu - v + w
Booster <-> UT Maximum Path Loss	dB	161.41	zz = jj - uu - v + w

❖ **BTS Coverage**
(ITU vehicular Model)
= 14.15 km

❖ **Booster Coverage**
(ITU vehicular Model)
= 26.94 km

- **Operation Frequency**
= **2140 MHz**
- **Service Antenna Height**
= **60 m**
- **Channel Data rate**
= **144 kbps**

Target Coverage for Uplink

Link Budget of RX Channels

Parameter	Unit	Value	Equation
Voice Channel Data Rate	kbps	12.20	a
Bandwidth / FA	MHz	3.84	b
UT Output Power	dBm	21.00	c
UT Antenna Gain	dBi	2.00	d
UT EIRP	dBm	23.00	ee = c + d
Booster/BTS Antenna Gain	dBi	17.00	f
Booster<->Antenna Cable Loss	dB	0.50	g
BTS<->Antenna/Booster Cable Loss	dB	4.00	h
Thermal Noise	dBm/Hz	-174.00	i
Booster/BTS RX Noise Figure	dB	2.50	j
RX Noise Power	dBm	-105.66	mm = i + 10log(b) + j
Interference Margin	dB	2.00	n
RX Total Noise Power	dBm	-103.66	oo = mm + n
Processing Gain, 12.2k voice	dB	24.98	pp = 10log(b/a)
Required Eb/No	dB	5.50	q
Fast Fade Margin	dB	4.00	r
BTS Receiver Sensitivity without Antenna	dBm	-119.14	ss = oo - p + q + r
BTS Receiver Sensitivity with Antenna	dBm	-132.14	tt = ss - f + h
Booster Sensitivity without Antenna	dBm	-119.14	uu = oo - p + q + r
Booster Sensitivity with Antenna	dBm	-135.64	vv = uu - f + g
Log-normal Fade Margin	dB	7.00	w
Soft-handover Gain	dB	3.00	x
BTS <-> UT Maximum Path Loss	dB	151.14	yy = ee - tt - w + x
Booster <-> UT Maximum Path Loss	dB	154.64	zz = ee - vv - w + x

❖ **BTS Coverage**
(ITU vehicular Model)
= **13.19 km**

Booster Coverage
(ITU vehicular Model)
= **17.19 km**

- **Operation Frequency**
= **1950 MHz**
- **Service Antenna Height**
= **60 m**
- **Channel Data rate**
= **12.2 kbps**