TRIAL REPORT
AS-BUILT DOCUMENT

RACAL ANTENNA – TYPE 1661

GUNUNG PINANG - SERANG

MAY- 2005

1. General Information

A. Site Information

Site Name	:	Gunung Pinang – Serang
Type of Site	:	Tower – 40m
Site Contact Person	:	Mr.Batara / Mr.Dimas
Contact Number / Email	:	0811102046 / 0811987717

B. Contractor Information

Name of Contractor	:	PT. Pacific Wave Telecommunication
Person in Charge	:	Mr. Andrew Herman Susilo
Contact Number / Email	:	Mobile 08159757375 / 081310727597 ignandrewhs@pacific.net.id

C. Summary Material / Component Supplied by PT PACIFIC WAVE

Number of Antenna	:	2 pcs Dual Polarised Dual Band Antenna GSM 900 / 1800 XP / 85 / 16 / 4 (Racal PW-1661-2) 2 pcs Dualband combiner (Dipexer) Brand “LGP-Sweden” type 15302 (Double Unit)

D. Summary of Installation Schedule

Installation Date	:	Start : [29 / 04 / 05]	Finish : [05 / 07 / 05]
Inspection Date	:	05 / 07 / 05	
Customer Representative	:	Mr. Adit	
Pacific Wave Engineer	:	Mr. Andrew Herman Susilo	

E. Document Record

Prepare by	Signature
Mr.Dimas Wicaksono	
Mr.Adithya Yudha	
Mr.Andrew Herman Susilo	

Checked by	Signature
Mr.Angky A Priyagung	

2. Scope of Installation

A. Overview

Gunung Pinang is located on top of the hill which is suitable to install antenna for surrounding coverage.

As network grows the existing GSM 900 BTS has highly utilization with full traffic capacity. To anticipate future need, PT OPERATOR should install additional DCS 1800 BTS. This site belongs to PT Telkom and is very strict for additional antenna or additional feeders. Thus the need to provide dualband antenna with 2 ports is highly on demand.

In order to achieve this requirement, PT.Pacific Wave Telecommunication over a dualband antenna with 2 ports which has internal diplexer to enable GSM 900 and DCS 1800 RF signal. This antenna expected to provide a consistent coverage, good signal quality and increase in traffic (additional revenue for DCS 1800).

B. Target of Installation

Existing antennas are only working on GSM 900 frequency with vertical polarization and 120^{o} horizontal beamwidth. As upgrading sites become dualband PT OPERATOR need dualband antenna with minimum coverage shrinking compare to before.

C. Installation Accommodation

- 2 pcs of dualband antenna Dual Polarised (cross polarization) Antenna GSM 900 / 1800 XP / 85 / 16 / 4, brand ”Racal”.
- 2 pcs Dualband combiner (Double unit), brand “LGP-Sweden”.

D. Scope of Installation

- **Site Planning and Technical Survey.**
  - Determine the area to be covered by Antenna Signal using Planet Tools.
  - Survey and Physical Check on the Site condition to ensure the space and accessibility of Installation/replacement of antenna.
- **Physical Installation.**
  - Installation of Racal dual polarised dual band antenna.
- **Setting & Network Performance Test.**
  - RF Drive Test to ensure the Coverage of Cellular Signal (Before & After) which capture.
  - Measurement of antenna Signal (Signal Strength, Quality, etc) around the area covered.
  - Observation using measurement of static parameter (EMD, RF Loss, Traffic and Dropcall).
- **Report & Documentation.**
  - Prepare As-Built Trial Report which includes photograph and drive test result and statistic observation (before and after).

3. Photograph of Antenna Component

This will contain photograph(s) of antenna

Antennas sector 1 and sector 2

Antenna Racal

4. Technical Specification Comparison

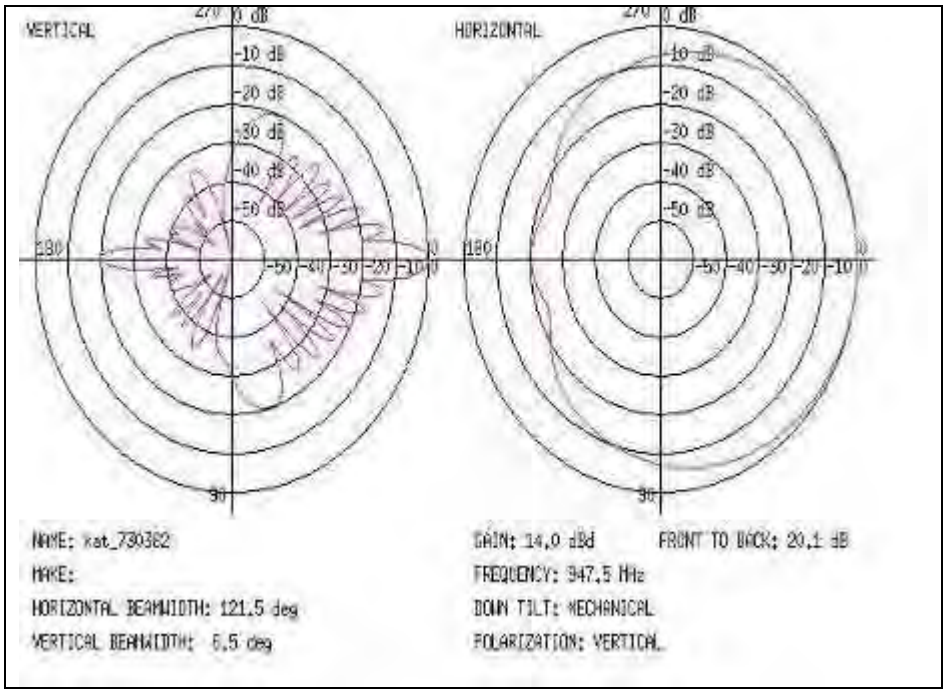
ANTENNA																	
TYPE	Manufacturer	BAND	POLAR	BAND SPEC	HBW	VBW	GAIN	FBR	USS	VSWR	IBP	IBB	# PORT	ELEC TILT		DIPLEXER	DIMENSION
		SGL/DUAL			degree	degree	dBi	dB	dB	ratio	dB	dB		degree	type	int/ext	h * w * d (mm)
730382	KATHREIN	SINGLE 900	vertical	870 - 960	120	6,5	16	>20	-	<1.3	-	-	1	0	N/A	-	2574 / 258 / 103
1661	Racal	DUAL	cross	870 - 960	85	8,6	16	>25	>17	<1.5	>23	-	2	4	fixed	internal	2330 / 253 / 180
1661	Racal	DUAL	cross	1710 - 1880	85	6,6	15,8	>25	>13	<1.5	>23	-	2	4	fixed	internal	2330 / 253 / 180

Remarks :

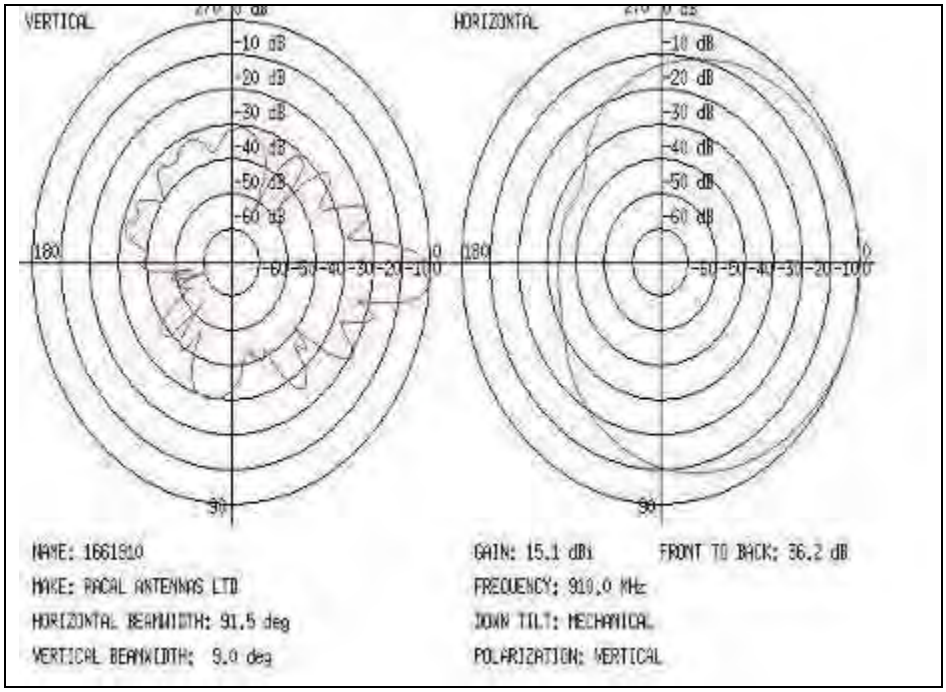
1. Kathrein 730382 only handle GSM 900, meanwhile RACAL “1661” can deliver signal GSM 900 and DCS 1800
2. Both antenna has similar gain (16dBi)
3. Kathrein has vertical polarization, but RACAL is cross polarization with 45º slant element which able to improve better uplink without requirement of space diversity.
4. Kathrein has 120 degree horizontal beamwidth, RACAL has 85 degree horizontal beamwidth which is suitable for urban are to reduce interference.
5. Kathrein’s beamwidth is 6,5 degree but RACAL’s vertical beamwidth is 8,6 degree with upper side slobe suspresion > 17 dB
6. RACAL ‘1661’ has 2 input ports which require external dual band combiner near BTS with lesser feeder length.
7. RACAL ‘1661’ has higher front to back ratio (>25 dB) compare to Kathrein only > 20dB.
8. VSWR input for Kathrein is 1,3 but RACAL is 1,5 dB.
9. Kathrein has no electrical tilt so we need to adjust using mechanical tilt, meanwhile RACAL has 4 degree electrical downtilt.
10. Kathrein antenna is longer (2,5 m) with 12 Kg weight, but RACAL only 2,3 m with 17,5 Kg weight

ANTENNA PATTERN

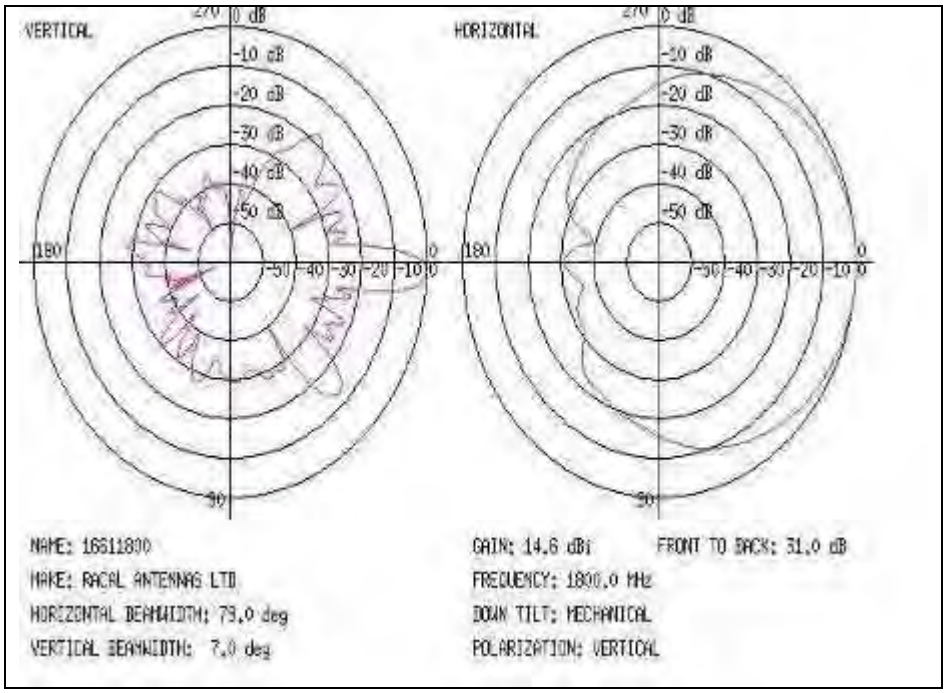
Pattern_Kathrein_730382



Pattern_Racal_1661(910)



Pattern_Racal_1661(1800)



5. Coverage Measurement Result

SITE DATABASE INFORMATION

BEFORE

Cell_id	Site_name	Sec.	Coordinates		**Antenna Height (m)**	**Azimuth (deg)**	**Dtilt (deg)**
			Lat	Long			
2702	Gunung Pinang	1	6 03’30.20”S	106 06’01.40”E	30	100	6 Mech / 0 Elect
2752	Gunung Pinang	2	6 03’30.20”S	106 06’01.40”E	30	290	6 Mech / 0 Elect

AFTER

Cell_id	Site_name	Sec.	Coordinates		**Antenna Height (m)**	**Azimuth (deg)**	**Dtilt (deg)**
			Lat	Long			
2702	Gunung Pinang	1	6 03’30.20”S	106 06’01.40”E	30	100	0 Mech / 4 Elect
2752	Gunung Pinang	2	6 03’30.20”S	106 06’01.40”E	30	290	0 Mech / 4 Elect

In order to have a comprehensive comparison, we conduct few comparison :

- Coverage plot using planet tools for both antenna.
- RF drive test (before & after) which cover Rxqual, Rxlev, SQL
- Statistic observation for EMD, RF loss, Traffic, Dropcall.

DRIVE TEST Coverage and Quality Results

Gunung Pinang Sector 1 RxLev_IDLE

BEFORE

GnPinang_sec1_RxLev_IDLE_GSM

AFTER

GnPinang_sec1_RxLev_IDLE_GSM

GnPinang_sec1_RxLev_IDLE_DCS

Gunung Pinang Sector 1 RxLev_DED

BEFORE

GnPinang_sec1_RxLev_DED_GSM

AFTER

GnPinang_sec1_RxLev_DED_GSM

GnPinang_sec1_RxLev_DED_DCS

Gunung Pinang Sector 1 RxQual_DED

BEFORE

GnPinang_sec1_RxQual_DED_GSM

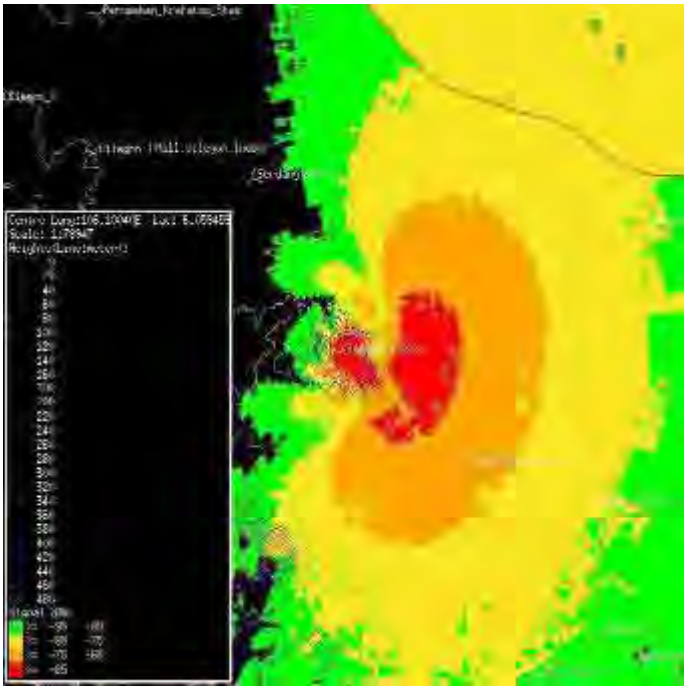
AFTER

GnPinang_sec1_RxQual_DED_GSM

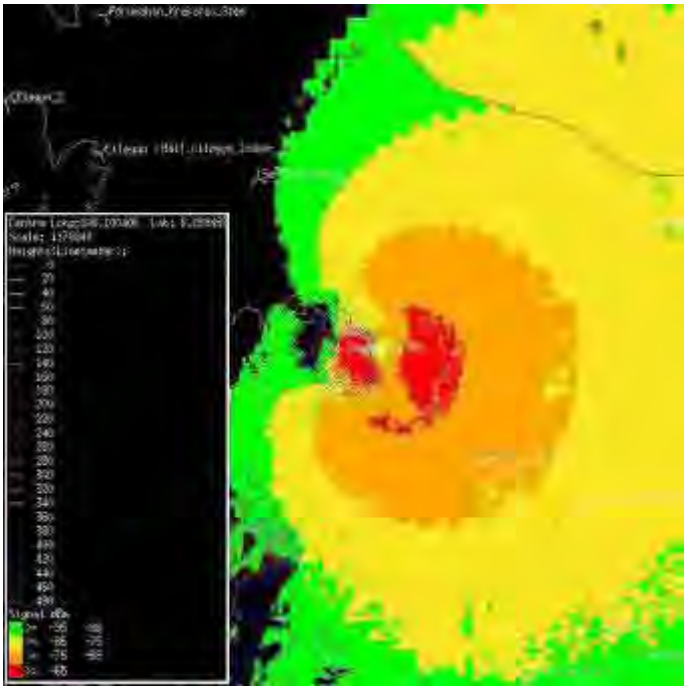
GnPinang_sec1_RxQual_DED_DCS

PLANET PLOT GUNUNG PINANG Sector 1

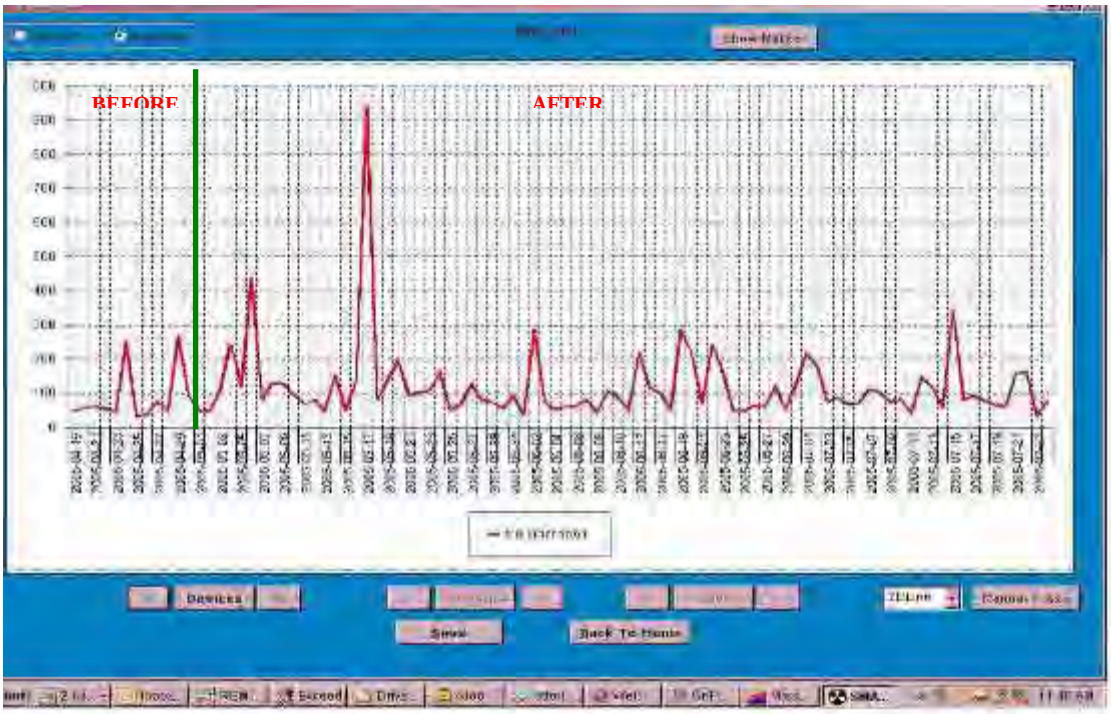
BEFORE (730382 mechtilt 6)



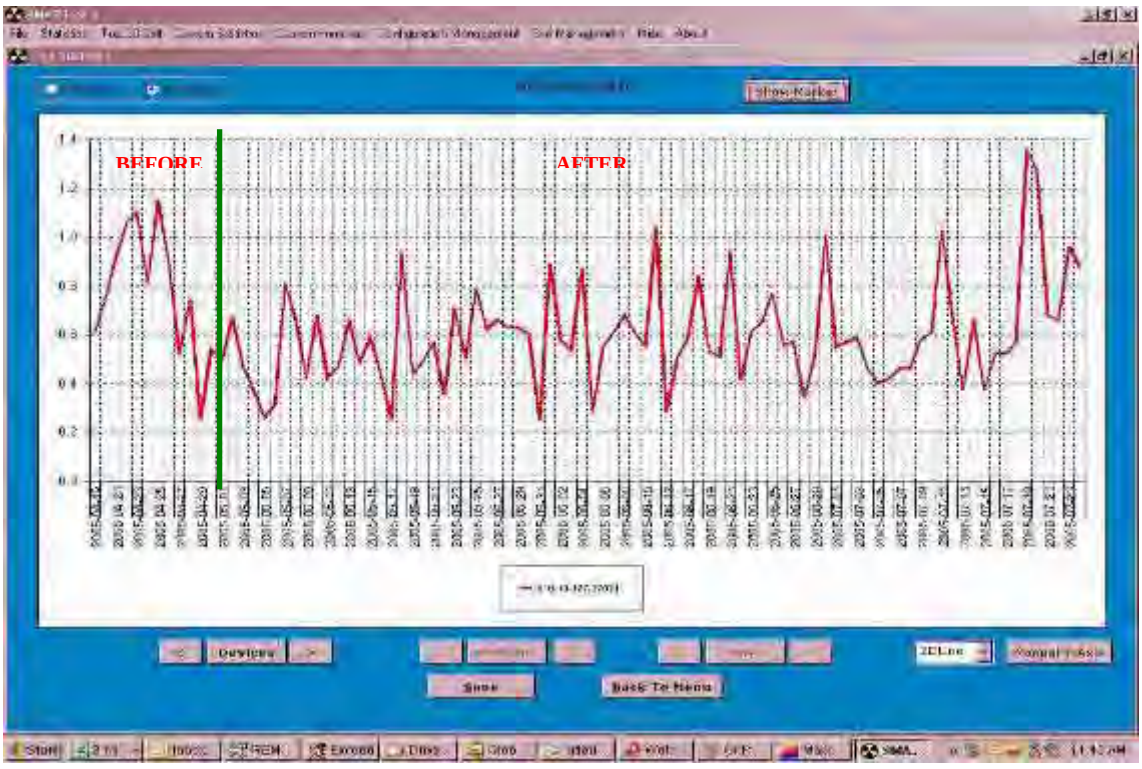
AFTER (1661 electilt 4)



Gunung Pinang Sector 1 EMD_GSM



Gunung Pinang Sector 1 RFLOSS_GSM



6. Summary

Dual band antenna (RACAL-1661) is suitable for new dualband / collocated site which has restriction on additional antenna / RF feeder. This solution doesn't need additional RF feeder but requires dual band combiner.
Antenna has generated better coverage compare to previous antenna with good EMS, less drop call and contrant traffic. Drive test result shows improvement in coverge for Rxlev (idle and dedicated) as well as RxQual.
Statistic record shows that there's no significant changes in EMD (Erlang Minute Drop) with constant RF loss.