

Prepared (also subject responsible if other) Umesh Joon		No.		
Approved	Checked	Date 13-03-2020	Rev Ver1.0	Reference

## MOP of RSSI Troubleshooting & Monitoring in Ultra Flexi /SBTS for Nokia Site

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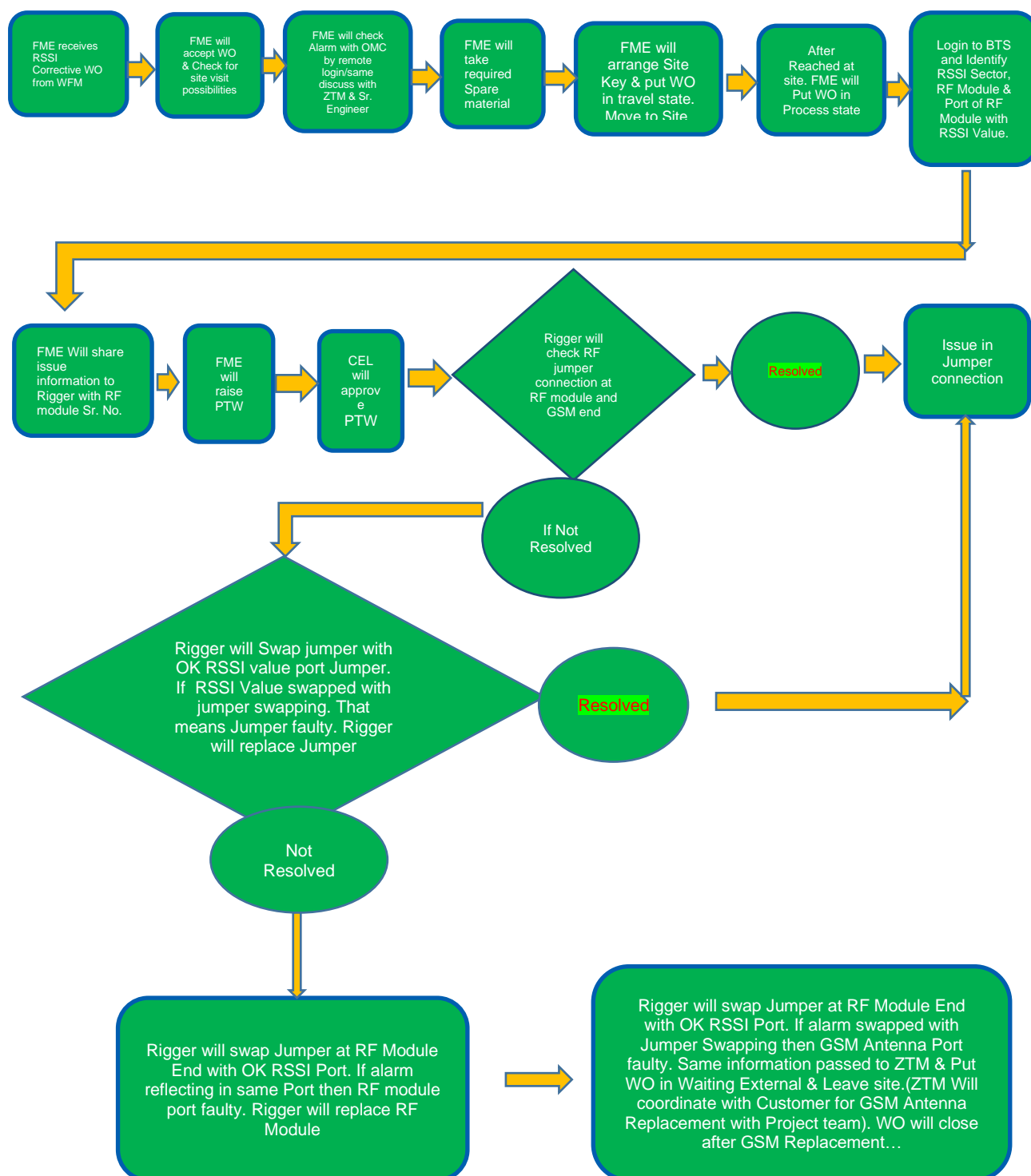
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## Activity Description

Alarm Name	RSSI alarm is showing in SBTS/OSS with name "BASE STATION SERVICE PROBLEM Alarm "7604 BTS operation degraded"
Alarm Description	
Possible Causes	

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## Flow Chart



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## Activity Details

### SBTS-2G RSSI Troubleshooting

1. RSSI alarm is showing in SBTS/OSS with name “BASE STATION SERVICE PROBLEM” & to get details of fault location additional information has to be analyze
2. BTS /SEG name in addition info.
3. RF & ANT line will identify from distinguished name.

Alarm Text	Distinguished Name	Supplementary Information	Additional Info
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-902394/EQM_R-1/APEQM_R-1/RMOD_R-3/ANTL_R-4	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:821
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-903572/EQM_R-1/APEQM_R-1/RMOD_R-1/ANTL_R-3	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:990
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-901921/EQM_R-1/APEQM_R-1/RMOD_R-3/ANTL_R-5	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:679
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-900244/EQM_R-1/APEQM_R-1/RMOD_R-8/ANTL_R-3	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:61
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-905295/EQM_R-1/APEQM_R-1/RMOD_R-3/ANTL_R-5	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:260
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-902101/EQM_R-1/APEQM_R-1/RMOD_R-2/ANTL_R-5	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:71
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-902101/EQM_R-1/APEQM_R-1/RMOD_R-7/ANTL_R-3	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:72
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-902101/EQM_R-1/APEQM_R-1/RMOD_R-7/ANTL_R-1	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:72
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-900071/EQM_R-1/APEQM_R-1/RMOD_R-1/ANTL_R-3	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:615
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-900313/EQM_R-1/APEQM_R-1/RMOD_R-2/ANTL_R-1	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:465
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-900522/EQM_R-1/APEQM_R-1/RMOD_R-5/ANTL_R-3	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:413
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-903013/EQM_R-1/APEQM_R-1/RMOD_R-3/ANTL_R-3	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:297
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-905152/EQM_R-1/APEQM_R-1/RMOD_R-5/ANTL_R-3	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:472
BASE STATION SERVICE PROBLEM	PLMN-PLMN/MRBT-905850/EQM_R-1/APEQM_R-1/RMOD_R-1/ANTL_R-3	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:552
BASE STATION SERVICE PROBLEM	MRBT-902237/EQM_R-1/APEQM_R-1/RMOD_R-4/ANTL_R-6	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:636
BASE STATION SERVICE PROBLEM	MRBT-902237/EQM_R-1/APEQM_R-1/RMOD_R-2/ANTL_R-4	RSSI difference between main and diversity paths exceed the threshold	degraded_cells=GSM:635

### SBTS Alarm Window

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Severity	Appeared	Alarm ID	Alarm Name	Fault ID	Fault name	Alarming Object	Number of Impacted Cells
Warning	2019-12-31 00:48:15	7109	BASE STATION SECURITY PROBLEM	61652	R&D Service Port enabled	MRBTS-905836/EQM_R-1/APEQM_R-1/CABINET_R-1/SMOD_R-1	See Details window
Warning	2019-12-31 00:48:15	7109	BASE STATION SECURITY PROBLEM	61524	SSH enabled	MRBTS-905836/EQM_R-1/APEQM_R-1/CABINET_R-1/SMOD_R-1	See Details window
Warning	2019-12-31 00:50:14	7115	BASE STATION INFORMATION	4072	Parallel optical link length mismatch	MRBTS-905836/EQM_R-1/HWTOP_R-1/CABLINK_R-1005	None
Warning	2019-12-31 00:55:01	7115	BASE STATION INFORMATION	2016	BB bus reception error (MUKSU)	MRBTS-905836/EQM_R-1/HWTOP_R-1/CABLINK_R-1005	None
Warning	2020-01-03 16:30:38	7107	BASE STATION CONNECTIVITY PROBLEM	6322	RIM interface timeout	MRBTS-905836/LNBTS-905836/LNADJG-2	See Details window
Warning	2020-02-09 20:53:36	7116	BASE STATION SERVICE PROBLEM	2404	RSSI difference between main and diversity paths exceed the threshold	MRBTS-905836/EQM_R-1/APEQM_R-1/RMOD_R-2/ANTL_R-1	Degraded: 1

## RSSI Alarm Description

click on alarm description window to get T-Shooting standard steps

MRBTS-905836

Not secure | https://10.196.81.124/#/alarms/current

Object name

MRBTS-905836

Severity

Appeared

Alarm ID

Alarm Name

Fault ID

Fault name

Alarming Object

Number of Impacted Cells

2019-12-31 00:48:15

7109

BASE STATION SECURITY PROBLEM

61652

R&D Service Port enabled

MRBTS-905836/EQM\_R-1/APEQM\_R-1/CABINET\_R-1/SMOD\_R-1

See Details window

2019-12-31 00:48:15

7109

BASE STATION SECURITY PROBLEM

61524

SSH enabled

MRBTS-905836/EQM\_R-1/APEQM\_R-1/CABINET\_R-1/SMOD\_R-1

See Details window

2019-12-31 00:50:14

7115

BASE STATION INFORMATION

4072

Parallel optical link length mismatch

MRBTS-905836/EQM\_R-1/HWTOP\_R-1/CABLINK\_R-1005

None

2019-12-31 00:55:01

7115

BASE STATION INFORMATION

2016

BB bus reception error (MUKSU)

MRBTS-905836/EQM\_R-1/HWTOP\_R-1/CABLINK\_R-1005

None

2020-01-03 16:30:38

7107

BASE STATION CONNECTIVITY PROBLEM

6322

RIM interface timeout

MRBTS-905836/LNBTS-905836/LNADJG-2

See Details window

2020-02-09 20:53:36

7116

BASE STATION SERVICE PROBLEM

2404

RSSI difference between main and diversity paths exceed the threshold

MRBTS-905836/EQM\_R-1/APEQM\_R-1/RMOD\_R-2/ANTL\_R-1

Degraded: 1

Web Element Manager

Connected to BTS

BTS ID: 905836

BTS Name: MUMFDTESUNSET...

SW ver.: SBT518A\_ENB\_1000\_001457\_000000

(GMT+5.5) Asia/Kolkata

Onair (LTE) Not commissioned WCDMA Onair GSM

Navigation Panel

Objects

Timeline

Object name

MRBTS-905836

Alarm Management

Active Alarms

Alarm History

Object name

Severity

Appeared

Alarm ID

Alarm Name

Fault ID

Fault name

Alarming Object

Number of Impacted Cells

2019-12-31 00:48:15

7109

BASE STATION SECURITY PROBLEM

61652

R&D Service Port enabled

MRBTS-905836/EQM\_R-1/APEQM\_R-1/CABINET\_R-1/SMOD\_R-1

See Details window

2019-12-31 00:48:15

7109

BASE STATION SECURITY PROBLEM

61524

SSH enabled

MRBTS-905836/EQM\_R-1/APEQM\_R-1/CABINET\_R-1/SMOD\_R-1

See Details window

2019-12-31 00:50:14

7115

BASE STATION INFORMATION

4072

Parallel optical link length mismatch

MRBTS-905836/EQM\_R-1/HWTOP\_R-1/CABLINK\_R-1005

None

2019-12-31 00:55:01

7115

BASE STATION INFORMATION

2016

BB bus reception error (MUKSU)

MRBTS-905836/EQM\_R-1/HWTOP\_R-1/CABLINK\_R-1005

None

2020-01-03 16:30:38

7107

BASE STATION CONNECTIVITY PROBLEM

6322

RIM interface timeout

MRBTS-905836/LNBTS-905836/LNADJG-2

See Details window

2020-02-09 20:53:36

7116

BASE STATION SERVICE PROBLEM

2404

RSSI difference between main and diversity paths exceed the threshold

MRBTS-905836/EQM\_R-1/APEQM\_R-1/RMOD\_R-2/ANTL\_R-1

Degraded: 1

Details

Conf alarm obj.: BTS\_L-1/BTS\_CONF-1/NP-101/SCF-1/MRBTS-905836/LNADJG-2

HW Path: /SMOD\_R-1/Left/BSMOD\_R-2/Left/Middle/rf...

SN: N/A

Impacted Cells: GSM...

Additional Information

Alarm details

Technology: GSM

Meaning:

The difference of received signal strength between the main and diversity paths of logical TRX at DSP is exceeding the threshold defined by BSC.

If the RSSI difference between main and diversity RX is a negative value, then the antenna hosting the RX main path is reported as faulty. Otherwise, the antenna hosting the RX diversity path is reported as faulty. Perform the following steps in the below order until the fault is cleared:

1. Check whether RXDS parameter from BSC/SEM is set to a reasonable value, and taking into account the site condition in order to prevent unnecessary alarms.

2. Check that antennas are correctly aligned.

3. Replace if antenna connector or cable is faulty.

4. Replace antenna line if it is faulty.

5. Replace the Radio module or Remote Radio Head.

Instruction:

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The screenshot shows the Nokia Web Element Manager interface for a BTS (BTS ID: 905836). The interface is divided into several sections:

- Navigation Panel:** Shows a tree view of the BTS components, including BBMOD, BSC, BTS MEDIATOR, CABINET, and CELL. The 'CELL' section is expanded, showing a list of cells (GNCEL-1 to GNCEL-3, LNCCEL-1 to LNCCEL-3, LNCCEL-21 to LNCCEL-23, LNCCEL-S1 to LNCCEL-S3, and MME).
- Runtime View:** Displays the configuration of the selected cell (GNCEL-1). It shows a diagram of the cell structure with components like SHOBs, RMOBs, LTE cells, and GSM cells. The 'Details' panel on the right provides more information about the cell.
- Details Panel:** Shows parameters for the selected cell (GNCEL-1):
  - GEH sector ID: 406
  - BCF ID: 903
  - GEH band: DCS-1800
  - Hopping mode: AntennaHoppingWithHopping
  - Rx Diversity: Enabled
  - Max output power per TRX: 43.0 dBm
  - BCH power: PLO
  - TRX-2: PLO
  - TRX information: A table showing TRX ID, Downlink freq. (MHz), Uplink freq. (MHz), Carriers, and RSSI values.

## Steps for rectification

1. Reconnectoriztion –RF jumper connection at RF module and GSM end .
2. Cable bend check-e2e.
3. TxRx cable e2e check-In Commissioning.
4. Rx-div cable connection correction & commissioning check according to RX diversity cable & RF module type.
5. Cable e2e swap to identify RF module /Antenna port fault.
6. RF module replacement
7. Antenna/Feeder cable replacement Swap Jumper at RF Module End with OK RSSI Port. If alarm reflecting in same Port then RF module port faulty. Rigger will replace RF Module.
8. Check external interference.

Check RSSI values (Given in next slide ) for further T-shooting /Monitoring

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MRBTS-905836 10:49:74.205

Not secure https://10.196.81.124/#/diagnostic/ant-monitoring

Web Element Manager

BTS Status Configuration Performance Alarms Software Diagnostic Procedures

Connected to BTS BTS ID: 905836 BTS Name: MUMFDTESUNSE...

Navigation Panel

Timeline

Expression

History size to load: 5.55 MB  
Do you want to continue?  
WARNING! Loaded history will take approx. 4 times more space in memory.  
YES NO

ID	Timestamp	Upd.
271	02/11/1731:09:00	27
272	02/11/1731:14:09	19
273	02/11/1731:19:09	15
274	02/11/1731:24:09	30
275	02/11/1731:29:09	12
276	02/11/1731:34:09	19
277	02/11/1731:39:09	48
278	02/11/1731:44:09	22
279	02/11/1731:49:09	16
280	02/11/1731:54:09	35
281	02/11/1731:59:09	15
282	02/11/1732:04:09	19
283	02/11/1732:09:09	24
284	02/11/1732:14:09	23
285	02/11/1732:19:09	16
286	02/11/1732:24:09	29
287	02/11/1732:29:09	22
288	02/11/1732:34:09	23

Antenna Line Online Monitoring

Select antenna lines to monitor

RHOD-1/RHOD\_2-2(FXEE)

☒ ANT1  
☐ ANT2  
☒ ANT3  
☐ ANT4  
☒ ANT5  
☐ ANT6

Start Stop Monitoring is ongoing... 00:14:06

Monitored values (PC time used)

VSWR (Total 84 time intervals, latest 30 shown)  
RTWP LTE (Total 84 time intervals, latest 30 shown)

RTWP WCDMA

No data available

RSSICEM (Total 14 time intervals)

Radio Module	Antenna/Port	RX Carrier	11.02.2020 17:32:39	11.02.2020 17:31:39	11.02.2020 17:30:39	11.02.2020 17:29:39	11.02.2020 17:28:39	11.02.2020 17:27:39	11.02.2020 17:26:39	11.02.2020 17:25:39	11.02.2020 17:24:39	11.02.2020 17:23:39
ANT1	GNCB-1/TTX-12		-103	0	0	0	0	-93	-93	-93	-92	-92
		GNCB-1/TTX-1	-94	-90	-92	-94	-94	-94	-95	-93	-93	-9
		GNCB-1/TTX-2	-101	-101	-102	-101	-102	-97	-101	-97	-98	-96
ANT2	GNCB-2/TTX-3		-65	-65	-69	-68	-65	-63	-65	-67	-66	-6
		GNCB-2/TTX-11	-69	-66	-68	-67	-62	-62	-65	-69	-69	-6
		GNCB-2/TTX-1	-69	-66	-68	-67	-62	-62	-65	-69	-69	-6

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## **ULTA/FLEXI RSSI**

Alarm "7604 BTS operation degraded" due the Rx Antenna Supervisory by Comparing RSSI Value (2) &

- For each sector, the differences outlined below are calculated:-

- \* Average differences
- \* Relative difference
- \* Antenna based difference

- Alarm "7604 BTS operation degraded", "RX levels differ too much between main and diversity antennas" is generated for alarming BTS (sector) and sent to BSC if any of the differences in the sector is above the threshold.

- NOTE ! If both antenna lines or antennas are damaged simultaneously, there will be no RSSI difference and no alarms can be generated.

- NOTE ! RSSI measurement is a "trendsetting" type of measurement. In order to get more accurate results about both the RX path and the RX level, external test equipment should be used.

## **Conditions for full functionality**

- RSSI Supervisory needs a definite number of samples from phone call(s) in order to operate. Sample rating is per TRX, the RSSI alarm is generated per sector.

- Min. 750 000 samples per TRX / hour are needed for an RSSI calculation. This can be achieved by either one continuous phone call (in average) or by 6 continuous phone calls, each of 10 minutes in length.

- First measurements results are available one hour after the BTS has reached a supervisory state. The measurements are then repeated every hour. The samples are collected simultaneously from both main and diversity branches from all TRX's and stored as "sample pair". The sample pair is accepted if as long as the other sample's RSSI level is over -95 dBm.

- To allow RSSI in sector the diversity must be activated (command ZEQM in BSC).

- It is essential that the BTS is commissioned correctly by the HW configurator in order to ensure full functionality of RSSI Rx Antenna Supervisory.



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## Average difference

A TRX difference comparison is carried out so that the difference between minimum and maximum antenna levels from four antennas (two antennas when 4-way diversity is not in use) are compared together.

If average difference is bigger than the limit, the alarm is activated.

Sector 1					
TRX	Ant1	Ant2	Ant3	Ant4	difference
ETRX 1	-70	-72	-69	-68	4
ETRX 3	-75	-77	-67	-65	12
ETRX 5	-73	-74	-70	-56	18
ETRX 7	-72	-73	-71	-70	3
Avg Diff.					9.25

RX level of div3 antenna (4UD)  
 RX level of div2 antenna (4UD)  
 RX level of div1 antenna  
 RX level of Main antenna.

Difference between minimum and maximum antenna levels from four antennas of TRX 1.  
 $\text{Max}(\text{Ant1}, \text{Ant2}, \text{Ant3}, \text{Ant4}) - \text{Min}(\text{Ant1}, \text{Ant2}, \text{Ant3}, \text{Ant4})$   
 In this case  $-68 - (-72) = 4$

Average difference of all TRXs in sector 1.  
 $= (4+12+18+3)/4 = 9.25$   
 If the limit is 10 dB, this would not cause alarm.

Sector2					
TRX	Ant1	Ant2	Ant3	Ant4	difference
TRX 1	-80	-70	(n/a)	(n/a)	10
TRX 2	-79	-68	(n/a)	(n/a)	11
TRX 3	-78	-69	(n/a)	(n/a)	9
TRX 4	-60	-72	(n/a)	(n/a)	12
Average difference:					10.50

If the alarm limit is 10 dB, this value would cause 7408 alarm.

**Summary:** TRX Difference can detect broken or poor antennas or antenna lines

## Relative difference

Relative difference calculation detects individual failures when the number of units per sector is high. Relative difference is calculated to each TRX in the sector.

Sector 1				Relative RX difference	
TRX	Ant1	Ant2	Difference	RX branch max	Relative RX difference
TRX 1	-70	-70	0	-70	0.6
TRX 2	-71	-72	1	-71	1.8
TRX 3	-60	-59	1	-59	-12.6
TRX 4	-69	-70	1	-69	-0.6
TRX 5	-70	-71	1	-70	0.6
TRX 6	-78	-79	1	-78	10.2

RX level difference between Main and Div1 antennas  
 RX level of div1 antenna  
 RX level of Main antenna.

Maximum RX level of current TRX 1

Average Max RX levels of all the other TRX in the same sector is subtracted from the Max RX levels of TRX.  

$$\text{RelativeRXdiff}_{\text{TRX}} = -\text{RXbranchMax}_{\text{TRX}} + \frac{(\sum \text{RXbranchMax}_{\text{TRX}}) - \text{RXbranchMax}_{\text{TRX}}}{\text{nbr\_of\_TRX} - 1}$$

$$= 70 + [(-70-71-59-69-70-78) + 70] / 5 = 0.6$$

Only positive values cause alarms. The difference seen is the relative to the other TRX's in same sector

TRX3 negative value does not cause an alarm (if the antenna line performance is better than average in sector the values are negative)

TRX 6 would cause an alarm if the limit is 10 dB.

**Summary:** Relative Difference can detect TRX Receiver faults or Antenna filter fault

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## BTS manager and RSSI measurement

In the BTS manager it is possible to see two different RSSI values:

- *Newest*: Shows the latest measurement result
- *Reliable*: Shows the latest succesfull measurement result

RSSI Comparison Values						
Newest						
TRX	Ant1	Ant2	Ant3	Ant4	Difference	Rel.
Sector 93						
ETRX 5	n/a	n/a	n/a	n/a	-	-
ETRX 6						
Reliable						
TRX	Ant1	Ant2	Ant3	Ant4	Difference	Rel.
Sector 93						
ETRX 5	-55	-53	n/a	n/a	2	0.00
ETRX 6	-53	-53	n/a	n/a	0	0.00
Avg. Diff.					1.00	
Antenne	Ant 3	Ant 4				
ETRX 5	-55	-53			2	
ETRX 6	-53	-53			0	
Avg. Diff.					1.00	