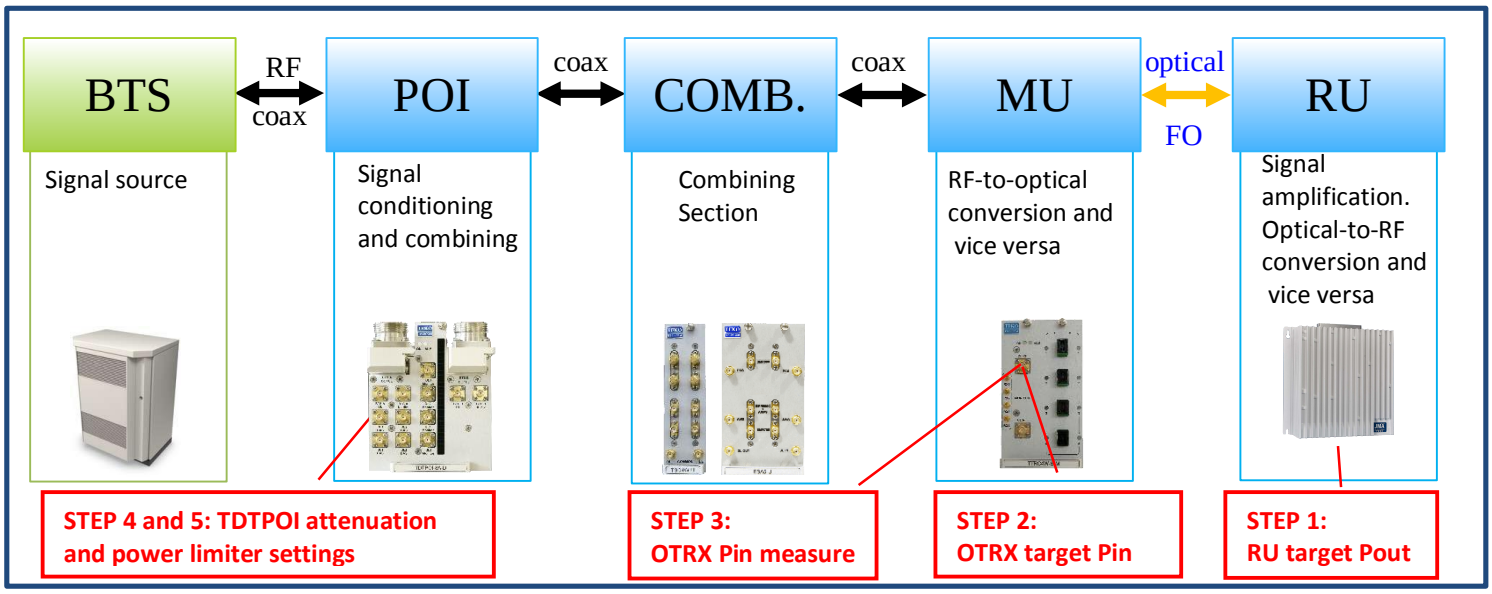
JMA Wireless
+1 315 431-7100
+1 888-201-6073
customerservice@jmawireless.com

Multi Operators (i.e. two) & Multi-bands (i.e. four) Optical System with TDTPOI
Low Power Remote Units - LTE Signal



RSRP BOOST if the difference between the full load channel power and the RSRP is lower than the standard value (i.e. 27.8dB with BW=10MHz)→ RSRP BOOST is exploited.

In this document it will be considered both cases in order to show the differences during the commissioning steps with **the standard value** $DELTA_{RSRP}$ (assuming BW=10MHz) = -27.8dB and with **RSRP BOOST** i.e. DELTARSRP= -25 dB→ RSRP BOOST=2.8

STEP 1 – DEFINE RU P_{out} TARGET BASED ON APPLICATION SCENARIO

$$RU\ P_{out}target = RU\ Comp\ P_{out} - Att_{customer} - 10\log_{10}(\#operators) - 10\log_{10}(\#carriers) - 10\log_{10}(\%tech) - DELTA_{RSRP} - Margin$$

Considered example:

a- Low Power Remote Unit → RU Comp P_{out} = 31 dBm composite

b- No additional attenuation requested by customer → $ATT_{customer}$ = 0 dB

c- 2 operator → - 3 dB

d- 1 frequency carriers → 0 dB

e- 100% of RU Power dedicated to LTE technology → 0 dB

f- $DELTA_{RSRP}$ standard = -27.8dB; RSRP BOOST = -25 dB

g- Margin = 1dB (*suggestion based on the RU gain passband ripple reported in datasheet*)

Standard: RU Pout target= -0.8 dBm/c RSRP
RSRP BOOST→ RU Pout target= 2 dBm/c RSRP)

STEP 2 – COMPUTE Pin TARGET @ OTRX

RU Low Power DL Gain = 36dB

→ *Considered example:* **Standard OTRX target P_{in}**= RU P_{out}target - DL_{gain} = -0.8 dBm/c RSRP – 36dB = **-36.8dBm/c RSRP**

RSRP BOOST → OTRX target Pin = -34 dBm/c RSRP

STEP 3 – MEASURE P_{in} @ OTRX WITH TDTPOI DEFAULT DL ATTENUATION SETTING

Considered example: **OTRX $P_{in}^{measured}$= - 56 dBm/c RSRP** (Spectrum Analyzer with demodulation feature is mandatory)

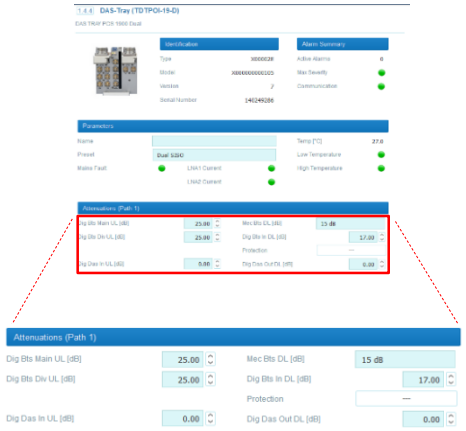
STEP 4 – SET TDTPOI DL AND UL ATTENUATION

Considered example: Difference between target and measured OTRX Pin = -36.8 - (-56) = 19.2dB (**RSRP BOOST** →OTRX Pin= -34 - (-56) = 22dB)
Since Mechanical attenuation Step = 5 dB → 5 dB Mechanical + 14.25 dB Att SW have to be removed
(**RSRP BOOST** → 5 dB Mechanical + 17 dB Att SW have to be removed)

→ **TDTPOI DL MECH ATT SETTING** = TDTPOI DEFAULT SW ATT DL – Difference target/measured = 15 – 5 = **10dB**

→ **TDTPOI DL SW ATT SETTING** = TDTPOI DEFAULT SW ATT DL – Difference target/measured = 17 – 14.25 = **2.75dB**
(**RSRP BOOST** → 10 dB Mechanical + 0 dB Att SW)
For UL path, since:

Module	DL Gain/Insertion Loss	UL Gain/Insertion Loss
TDTPOI (MIMO mode)	Insertion Loss = 18dB	Insertion Loss = 15dB
TSC4W-U	Insertion Loss = 7dB	Insertion Loss = 7dB
TESA5-U	Insertion Loss = 4dB	Insertion Loss = 4dB
Low Power Remote Unit	Gain = 36dB	Gain = 47dB
Max System Gain (0dB attenuation)	**Gain = 7dB**	**Gain = 21dB**



→ Max UL Gain is 14dB higher than DL Gain → If DL/UL Gain Balance is required
→ UL ATTENUATION = TDTPOI DL ATTENUATION + 14dB = **26.75dB** split as below:
RU UL ATTENUATION = 11dB (default settings)
TDTPOI UL ATTENUATION = 15.75dB DAS TRAY BTS side
(**RSRP BOOST** → 13 dB DAS TRAY BTS side)

STEP 5 – TDTPOI POWER LIMITER SETTING

Considered example:

A) TDTPOI to OTRX DL Insertion loss (TDTPOI at default DL attenuation setting):

TDTPOI I.L. + TDTPOI default DL att. + TSC4W-U I.L. + TESA5-U I.L. = 21 + 32 + 7 + 4 = 64dB

B) TDTPOI DL $P_{in\ RSRP}$ Estimation :

OTRX P_{in} measured + TDTPOI to OTRX DL I.L. = - 56 + 64 = 8 dBm/c RSRP

Set the Min RMS Threshold lower than the above value (i.e. 6dB) and enable the DL Power IN Low alarm

TDTPOI power limiter Min RMS Threshold = 2dBm

C) TDTPOI $P_{in\ RMS}$ Estimation:

B) + $10\log_{10}$(#carriers) + $delta_{RSRP/full}$ = 8 + 0 + 27.8 = 36dBm (**RSRP BOOST** →33dBm)

→ 1dB margin → **TDTPOI power limiter Max RMS Threshold = 37dBm** (max 49dBm, max with 10dB Mech Att = 46dBm)
(**RSRP BOOST** →34dBm)

Please note:

1) Remote Unit DL Power High/Low alarm are factory-disabled in order to avoid alarms during power-on phase. After the commissioning, as suggestion, enable the above alarm.
2) JMA TEKO **commissioning tool** automatically performs all the above calculation providing the system setting (attenuations and TDTPOI power limiter thresholds)
3) if DELTARSRP is customized there will be two cases: **KNOWN DELTA** → use it for the calculation; **UNKNOWN DELTA** → follow the steps below:
   a. Consider standard DELTARSRP to evaluate POI attenuations
   b. If OCNS is available→ after the commissioning simulate the full load channel and verify the OTRX input power.
      i. if OTRX input power is close to -5 dBm→ RSRP BOOST not exploited
      ii. if OTRX input power is lower than -5dBm → RSRP BOOST exploited→remove the attenuation from the POI in order to achieve -7dBm @OTRX Input during the OCNS (in order to have 2 dB of margin in case the OCNS doesn't use all the resource block)
   c. if OCNS is not available→ commissioning must be performed on standard DELTARSRP.
4) If CW test is performed through a portable signal generator:
   - Put the signal generator at its max output power (i.e. 12 dBm)
   - Put a physical attenuator to take the max power to -5dBm (i.e. 17 dB or higher)
   Please refer to JMA Technical Service Bulletin #03-001 for more details