

# 850MHZ-900MHZ FILTER SOLUTION

With the development of mobile communications technologies, operators have a requirement for combined of multiple bands and systems. They are concerned about the isolation between base station site, about the levels of spurious signals and blocking between 850Mhz and 900Mhz is high demand. This white paper illustrates the requirements on isolation between 2 band frequencies.

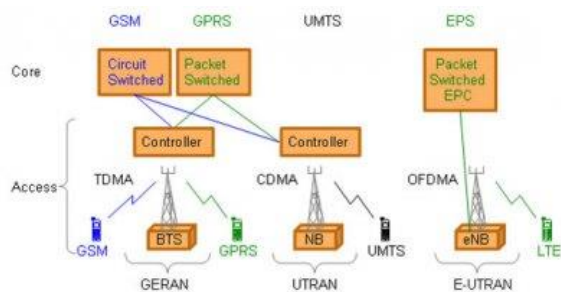


Figure. 3GPP Network topology

By sharing same telecom antenna structure, operator is using 850Mhz and 900Mhz should think how to optimize their frequency to avoid leakage signal fly form each system and make interference.

To do this operator should do optimization on their own network and share frequency table to another operator.

Band	Mhz	Uplink	Downlink
GSM-850	850	824.2 – 848.8	869.2 – 893.8
E-GSM-900	900	880.0 – 915.0	925.0 – 960.0

Table. 850Mhz and 900Mhz



Figure. 850Mhz and 900Mhz using same antenna feeder system.

They decided separate 5-10 Mhz frequency of 850Mhz DL to UL of 900Mhz system. But the property of frequency is limited and can make sure during operating if any unwanted signal crosses each other.

In the modulation of GSM is about 200Khz and multi carrier, the harmonic and IMD can be easy to effect signal make interference.

Worse in WCDMA and LTE when modulation is increase bandwidth from 5Mhz to 20Mhz.

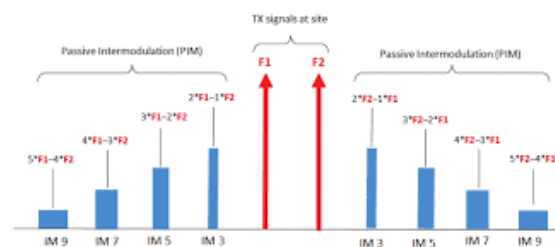


Figure. IMD3 2 carriers' theory.

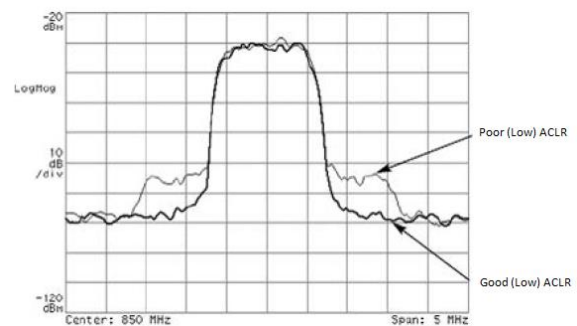


Figure. 850Mhz in WCDMA.

To avoid leakage signal operator decided to separate 2 frequencies far away each other. This way will work for low power. But when high power come up, leakage signal will Occurs and make noise to RX noise floor.

In this case we need a hardware to cut off at edge frequency. Signal harmonic from 850Mhz cannot reach 900Mhz system and revert are same.

Tamagawa made a device, we called Filter with high isolation > 50 dB from start to end of 2 systems.

After applied filter to system sharing same antenna. No interference occurs when transmits high power.



Figure. Filter hardware

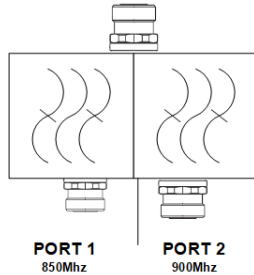


Figure. Block diagram

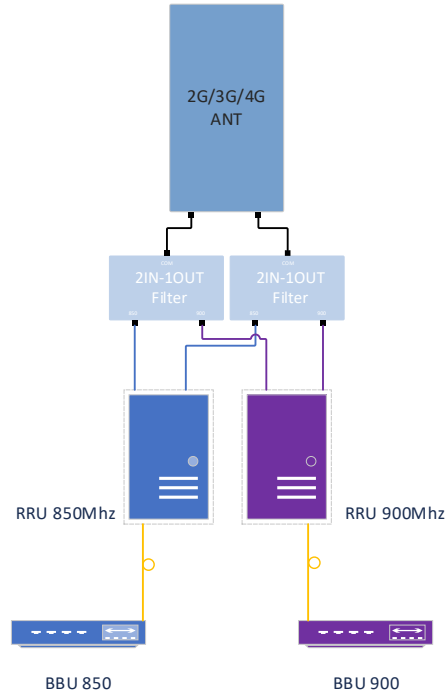


Figure. Network Added filter connection.

	850(Port1)	900(Port2)
Frequency Band	824~885MHz	890~960MHz
Insertion Loss	1.5dB max	1.5dB max.
V.S.W.R	1.3 max	1.3 max
Isolation (Port1 and 2)	50dB min	
PIMD	-153dBc (2tone +43dBm)	
Impedance	50Ω	
Average Maximum Power	CW 200 Max.	

Table. Specification of filter

The filter can work for any Technologies either GSM/WCDMA or LTE network.

It is outdoor use and lightning protect.

The filter with 2 inputs and 1 output port. 1 port run for 850Mhz and another is 900Mhz. It allows signal from base station goes to filter with very sharp edge.

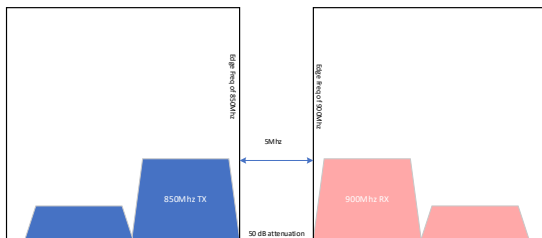


Figure. After installed filter

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