

## Definition of Interference

In General, Interference can be describe as other signal (normally at uplink path) which detected at BTS but doesn't belong to certain operator.

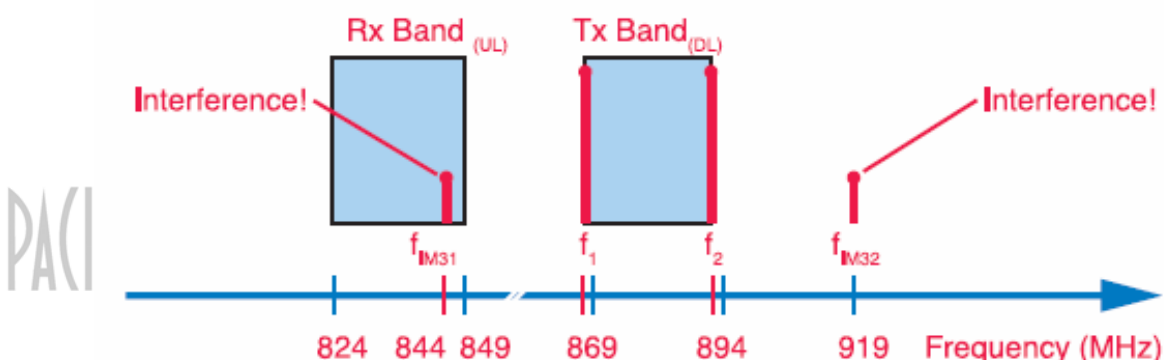
## Interference Classification :

### a. External Interference

- Adjacent Channel/Co-Channel between Outdoor Cell and dedicated Indoor Site
- Outdoor Signal Overshoot to indoor Coverage
- 3rd Party generate Un-License signal at GSM band.
- BTS generate un-expected signal.

### b. Internal Interference :

- \* Simple Combiner is un-able to cope site complexity
- Bad quality of existing Component generate IMD.
- Bad installation (Loose Connector at jumper/feeder, Loose Connection at antenna/Splitter) create IMD.
- Degrade of Component Quality especially in IMD



## What is PIM distortion ?

Ideal Passive device are considered linear.

PIM distortion is caused by Non-Linear mixing of two/ more frequency in passive devices (ie cable & connector)

PIM signal is un-Wanted because they interfere with signals in uplink path. In reality any linear component has a non-linear factor that can cause PIM distortion.

For Optimum Operation, PIM has to be kept at low level that has virtually no influence on Network Performance

### 3 Factors Cause PIM distortion :

#### a. Manufacturing & Design

- At High power level, hysteresis effect of material & non linear Voltage to current ratio may cause PIM.
- Contamination at soldering splatters that touch surface carrying RF signal.
- In-sufficient contact pressure & bad solder joint
- Dissimilar metals at contact area



## b. Installation Workmanship

- Bad connection causing RF heating through the skin will effect the RF performance
- Poor Mechanical Alignment of Component
- Too much or too little torque at connection.
- Contaminated Connector

## c. Environment Aspect

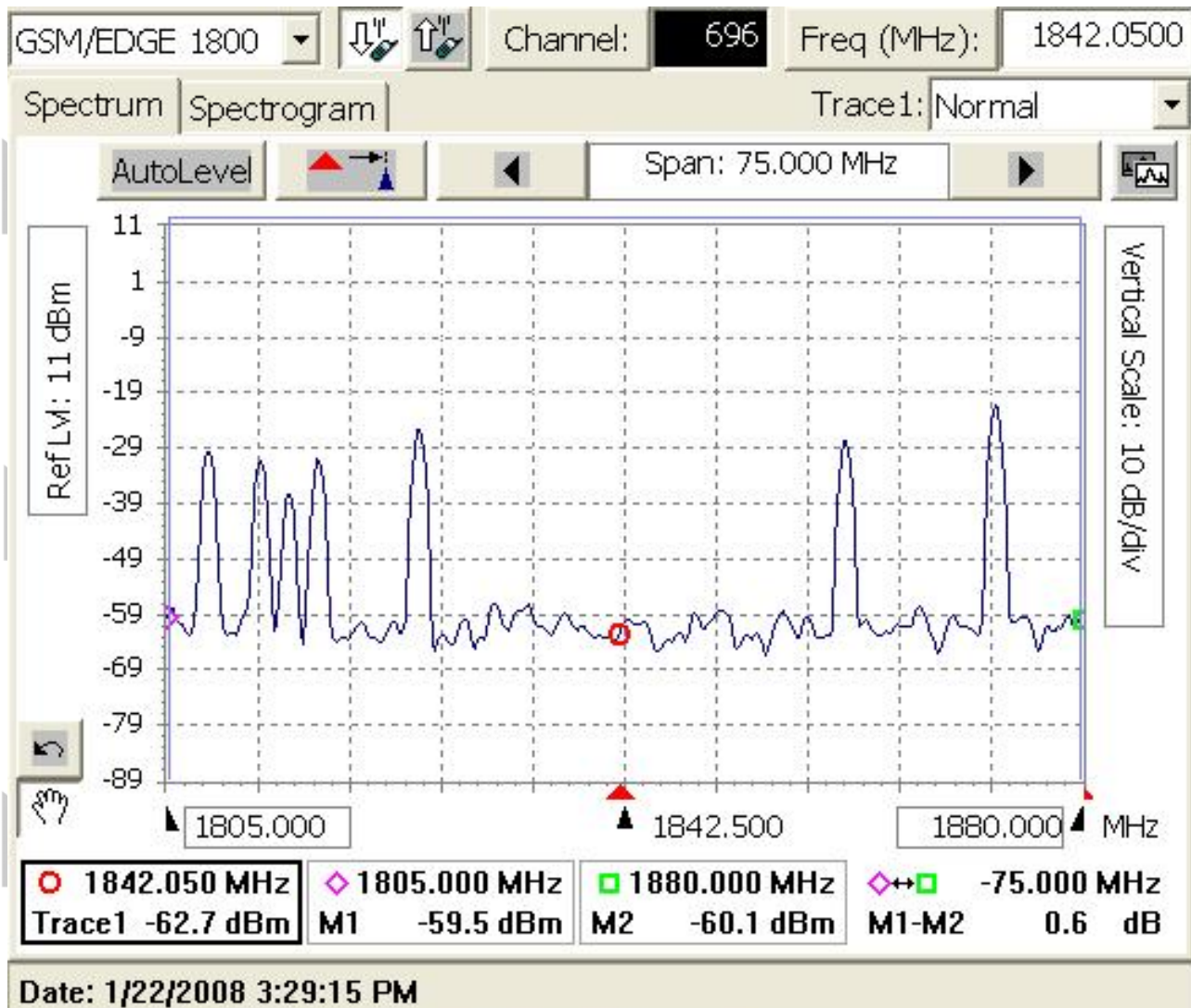
- Daily Temperature variations, thermal loading by sun & RF Heating can cause intermittent PIM.
- Wind induced Vibrations can weaken/break joints.
- Airborne dirt and moisture cause oxidation of materials with PIM distortion.





## Suggestion to avoid Interference :

- Proper Frequency planning between Cells
- Manually Ensemble combiner only suit for site with less Operator and Low Traffic as its not tested
- IMD is very important, can be achieved by :
  - Good Quality of Installation
  - Be Selective & Critical on Product Quality.



## Some consideration to solve interference

### If Interference occurs, we need to check :

- Channel used by each operator, so we can recognize unwanted channel..
- Historical activity from each operator (If there's any operator change frequency /output power etc)
- Does interference occur 24hours or intermittent
- Find out if BTS/Jumper Cable/other RF Component is connected properly or still under good condition ?

### Simple action which may solve Interference :

- Try to move/relocate the port having interference to other Port & observe.
- Try to connect Jumper cable from BTS directly to Indoor DAS system (by pass combiner) & observe
- Try to use Filter.
- Block/disconnect each BTS and observe it is disappear.