

3GPP TSG RAN Meeting #80
La Jolla, USA, June 11 - 14, 2018
Agenda item: 9.1.7

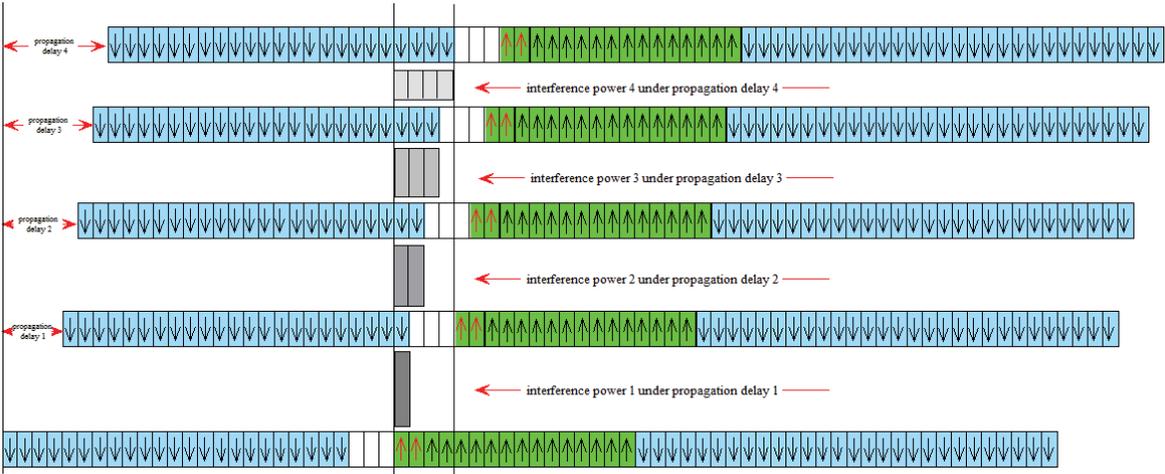
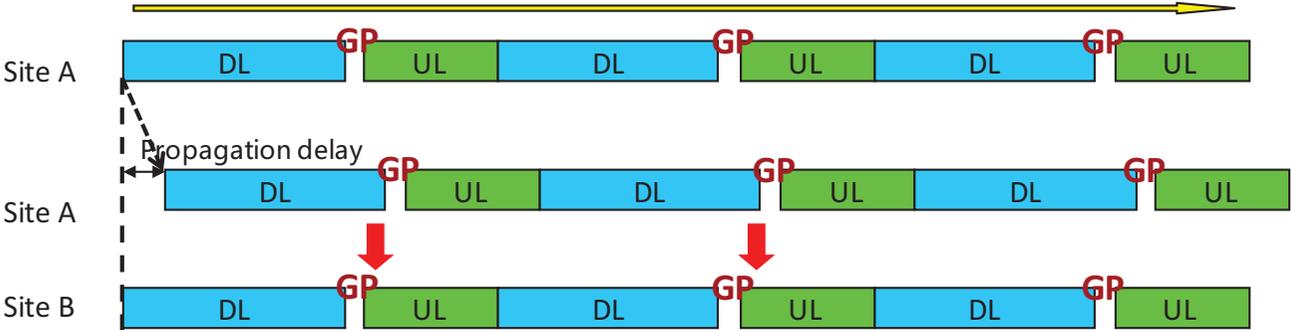
RP-181268

Motivation for Remote Interference Management in NR

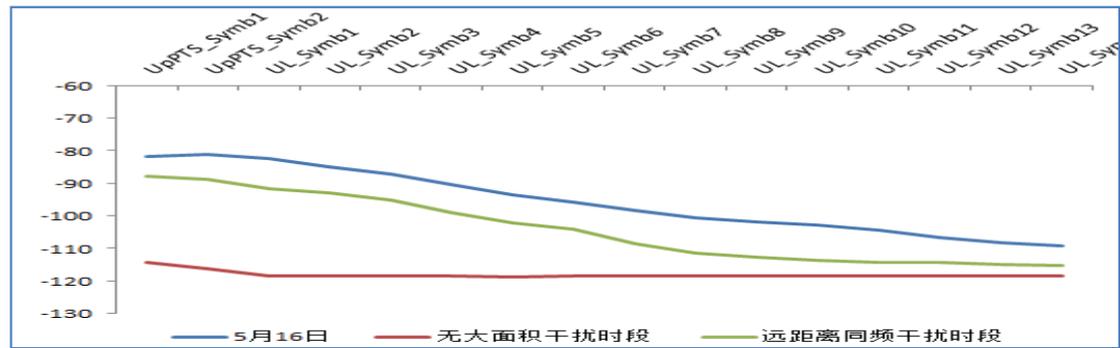
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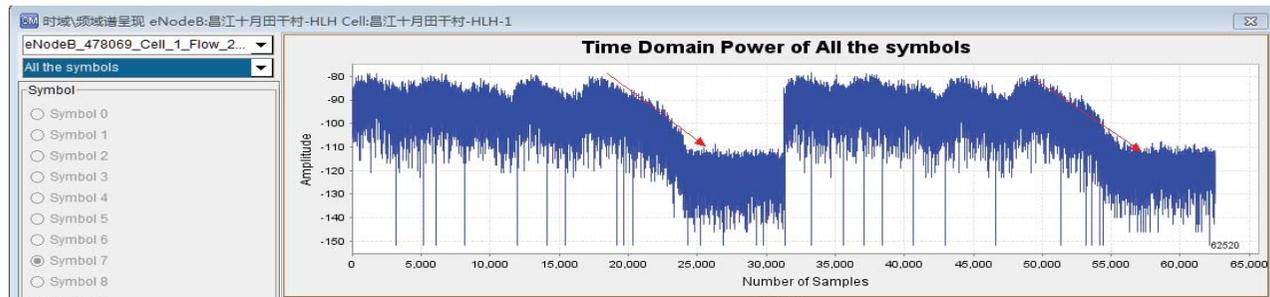
Occurrence of remote base station interference



Observation from time domain in TD-LTE field network deployed on 1.9GHz



Observed RIPs in eNBs before and after large scale interference occur, Statistics from Jiangsu province

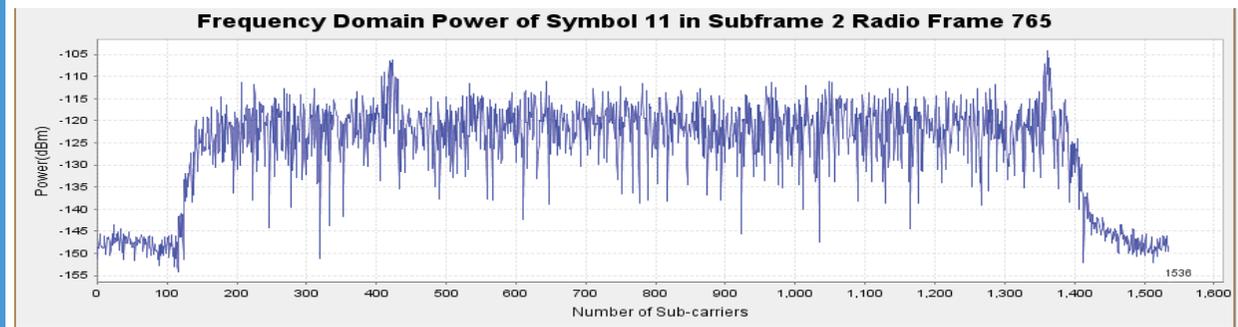
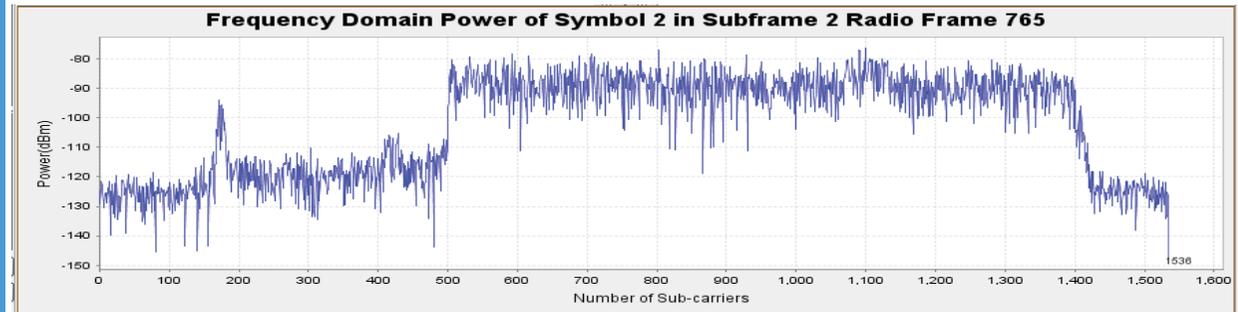


Observed RIPs in eNBs before and after large scale interference occur, Statistics from Hainan province

Observation from frequency domain in TD-LTE field network deployed on 1.9GHz

For each interfered UL OFDM symbol, deteriorated RIP is only observed on part of the whole carrier bandwidth, e.g., symbol 2 in subframe 2, while for each un-interfered UL OFDM symbol, mediocre RIP is observed

After analysis, eNBs contributing to interference are deployed on center frequency of EARFCN 38400/38404, which is different from that used in interfered eNBs deployed on center frequency of EARFCN 38350 in another areas as shown in next page



Interference scene: observation from frequency domain in TD-LTE field network deployed on 1.9GHz



All eNBs on the Island are deployed on center frequency of EARFCN 38350, and only eNBs of two test areas are deployed on center frequency of EARFC 38400/38404

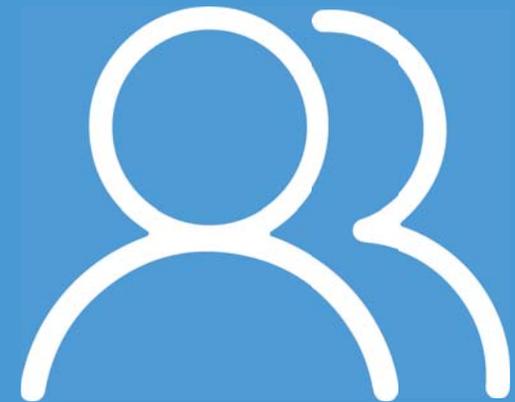
Measures tried and corresponding effect in TD-LTE field network

- Extend the GP to much larger one than normally required, e.g. use special subframe configuration 3:9:2 in stead of configuration 9:3:2
 - Interference is mitigated or diminished in some eNBs
- Adopt relatively aggressive power control strategy from Msg 1, e.g., preambleInitialReceivedTargetPower, pwerrampingstep and larger power incremental step, and similar strategy applied for following PUSCH and PUCCH
 - KPI is improved to some extension, and user complaint decreased
- Adopt larger antenna down-tilt of aggressor eNBs
 - Although RIP is decreased, network down coverage shrink and KPI is not improved
- Frequency isolation of interference
 - Hard to precisely locate the interference distance and the distance is varied with the atmosphere condition, not easy to use



SI Proposals

- In NR deployment on lower TDD frequency, the impact of the troposphere bending will continue existing if no special mechanisms are introduced. Though the design of the frame structure in NR has already considered much more flexible GP to leave larger room for avoiding the remote interference, it is necessary to study mechanisms for identifying when or how long will the long enough GP be configured, as well as corresponding gNB's behaviour and inter-gNB's coordination procedure.
- **The following objectives are proposed for unpaired spectrum focusing on synchronized macro cells with semi-static DL/UL configuration in co-channel.**
 - **A. Study mechanisms for improving network robustness and addressing strong remote base station interference, including [potential] UE side's enhancement [RAN1]**
 - **B. Study mechanisms for identifying which gNB(s) generate strong remote interference, including the following aspects:**
 - **i. Potential Reference signal design for gNB to identify that it creates strong inter-gNB interference to some victim gNB [RAN1]**
 - Existing reference signals are starting points of discussion.
 - **ii. Mechanism for gNB to start and terminate the transmission/detection of the reference signal(s) [RAN1, RAN3]**
 - **C. Study the potential additional coordination among gNBs for mitigating remote interference [RAN3, SA5]**





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Thank You