

上海贝尔TD- LTE无线网络优化及案例分析

2012-09

上海贝尔

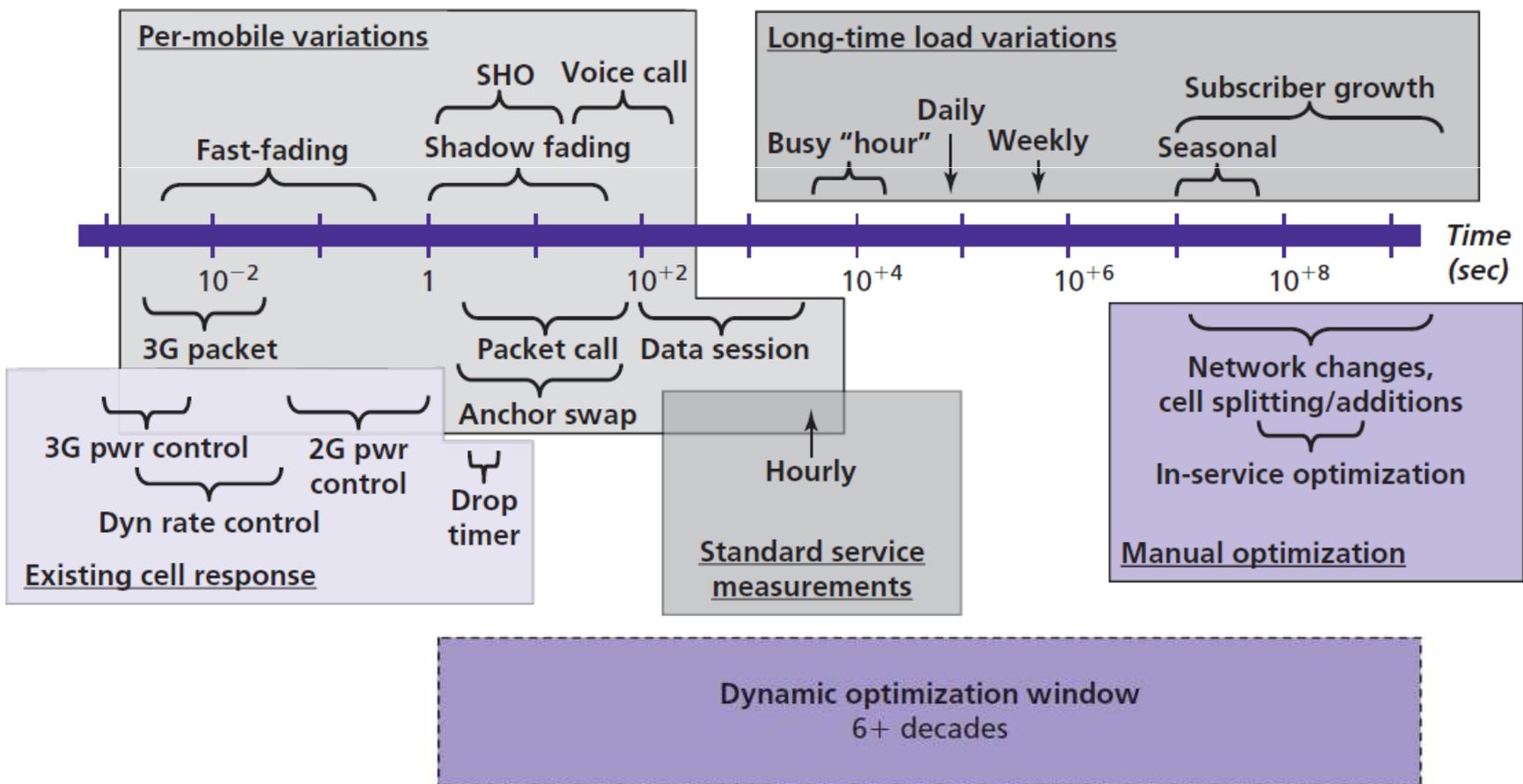
Alcatel-Lucent



通信人才网 www.iturhi.com

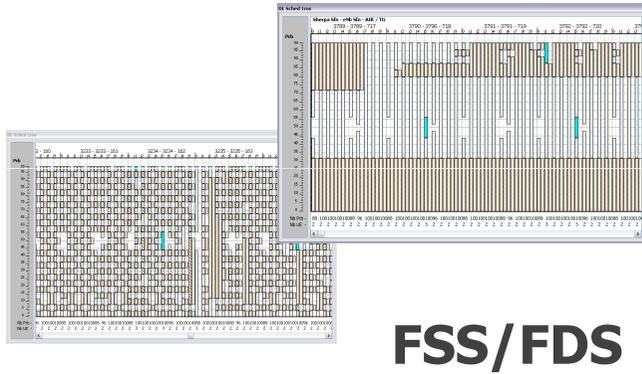
Relevant time scales

❖ Selected temporal scales relevant to dynamics (12 decades)



2G—Second generation Pwr—Power
 3G—Third generation Sec—Seconds
 Dyn—Dynamic SHO—Soft handover

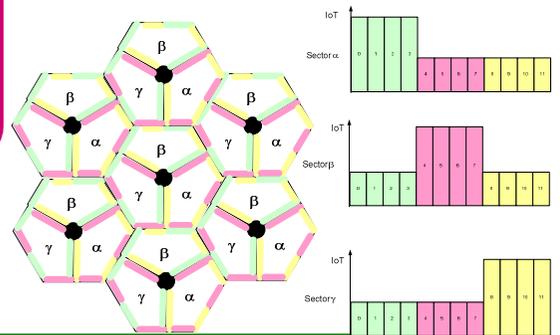
人工优化逐渐弱化，智能网络逐渐成型



对抗信道时变带来的衰落：

- 分集接收（多天线）
- Beamforming

智能调度
调制与信道编码自适应



对抗干扰带来的衰落：

- ICIC
- FPC (Fractional power control)

PCI 自分配算法
ANR算法



- Coverage - DL coverage & UL coverage
- Access
- Throughput - DL throughput & UL throughput
- Capacity, mainly the supported user number
 - ❖ DL control channel & UL control channel
- Latency - C-Plane latency & U-Plane latency
- Mobility, includes Intra-LTE and Inter-RAT mobility
 - ❖ Idle mode mobility
 - ❑ LTE Intra-Frequency & Inter-Frequency mobility
 - ❑ Inter-RAT mobility
 - ❖ Active mode mobility
 - ❑ LTE Intra-Frequency & Inter-Frequency mobility
 - ❑ Inter-RAT mobility

网络优化过程

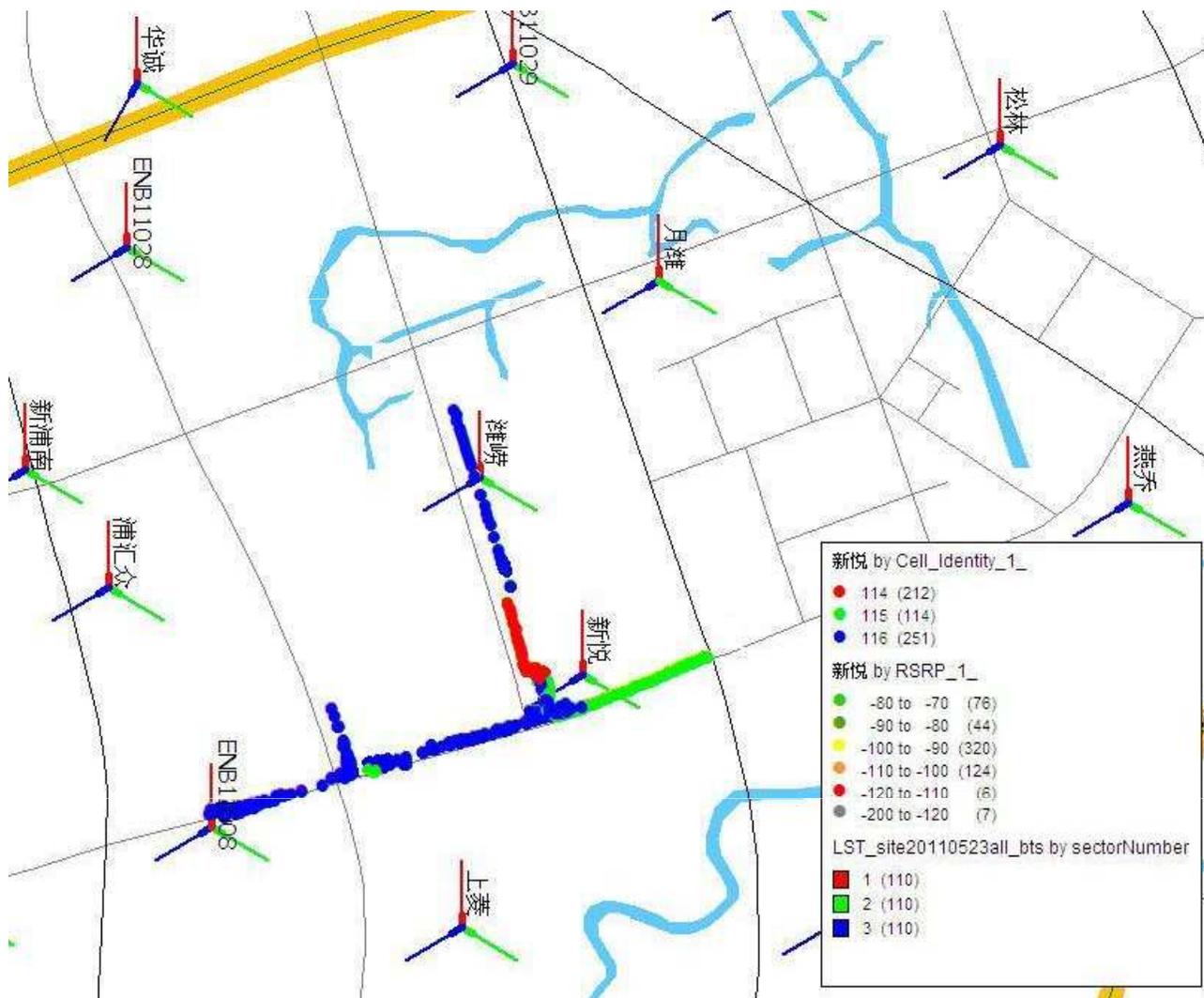


优化案例1—单站验证

小区错位问题发现



问题解决

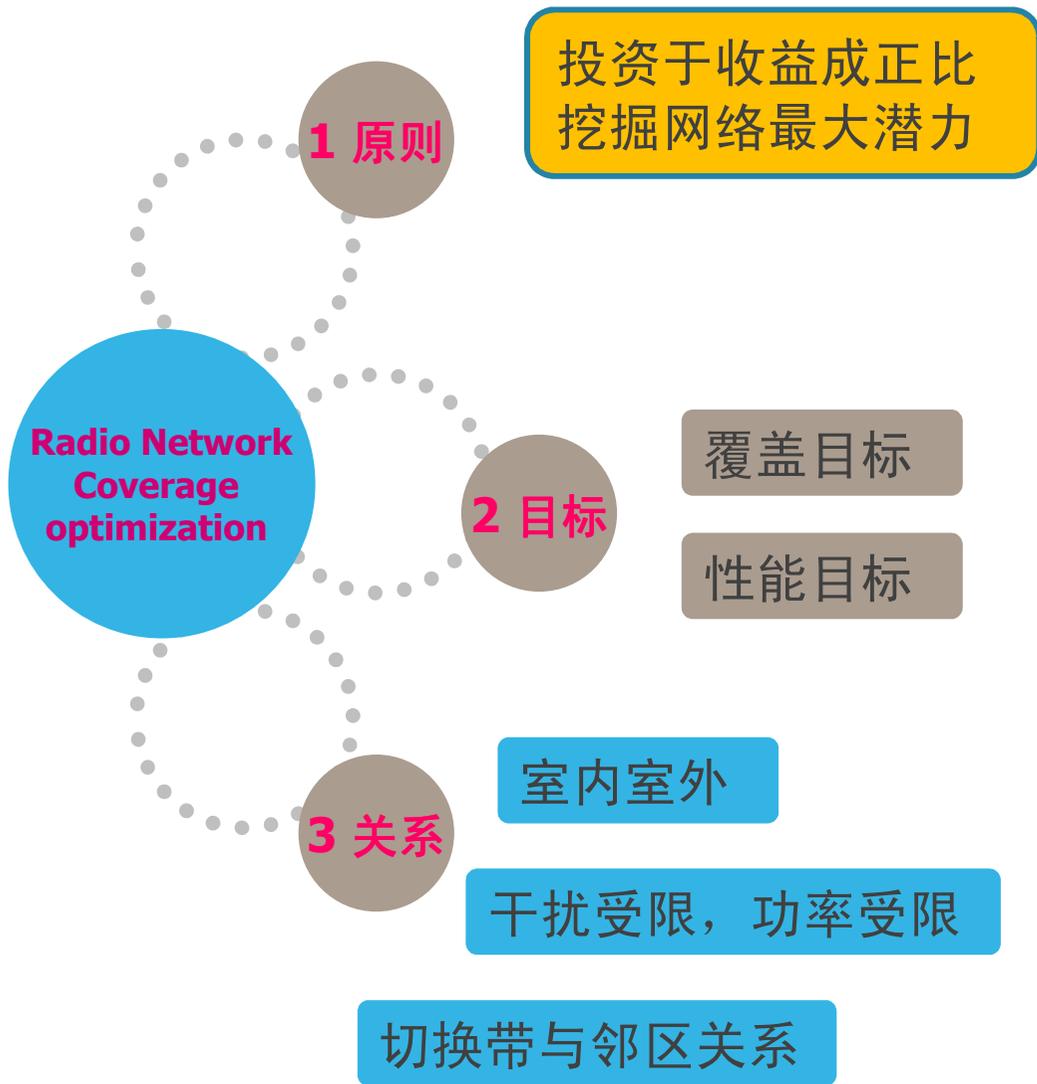


—可互换小区间的**Database**

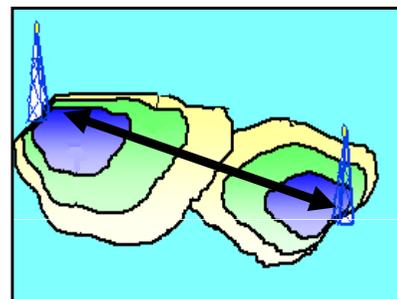
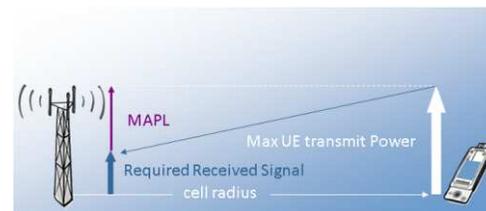
—**RRH**连接**D2U**的光纤互换

优化案例2—RF 覆盖优化

RF 覆盖规划

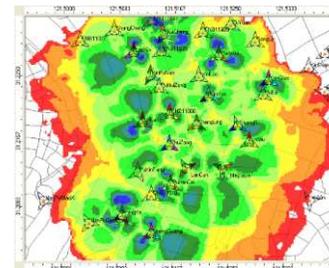


Link budget



Site distance

Simulation



Drive test



Optimization

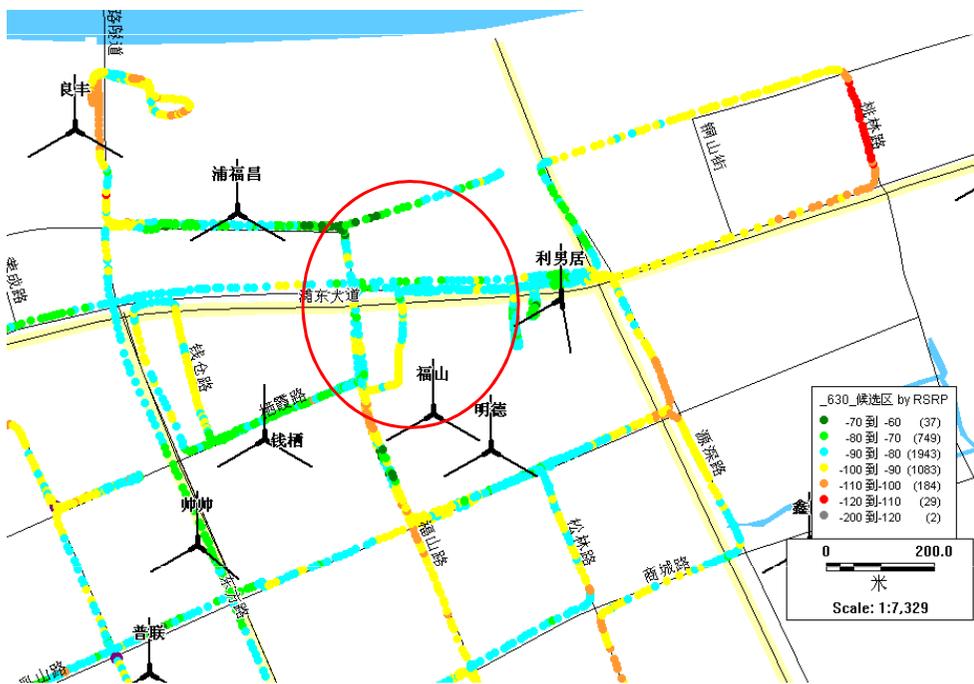
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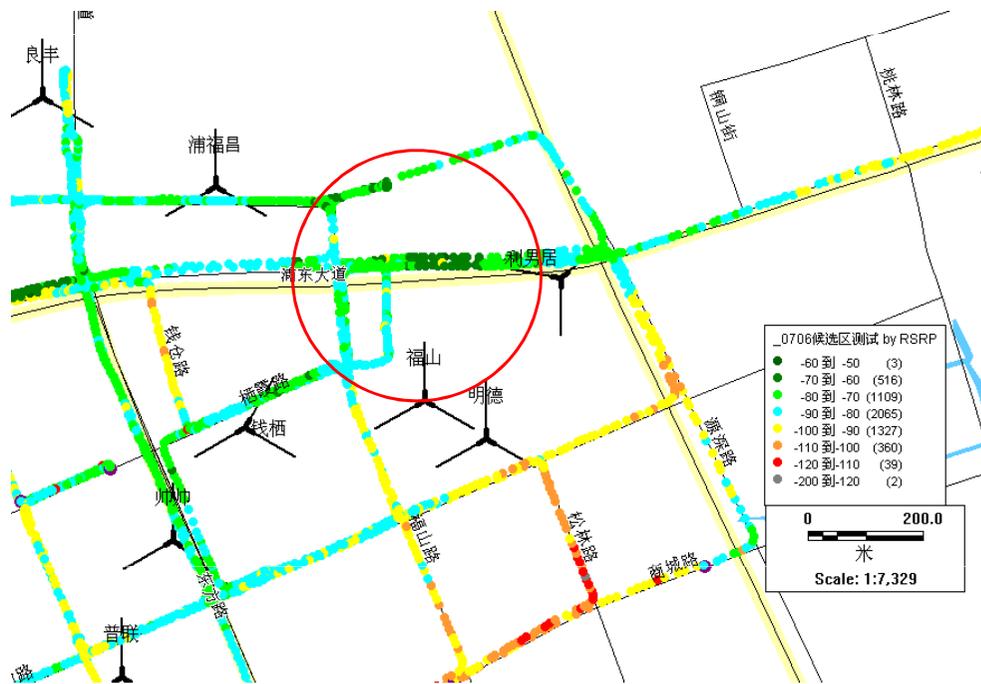


某区域优化前后RSRP覆盖图

- 根据路测结果分析最强小区，次强小区以及其他覆盖小区信号强度决定主服务小区
- 根据主服务小区适当减弱邻区对主服务小区的覆盖从而提高SINR的覆盖
- 调整方法：天线方位角，下倾角，功率控制参数

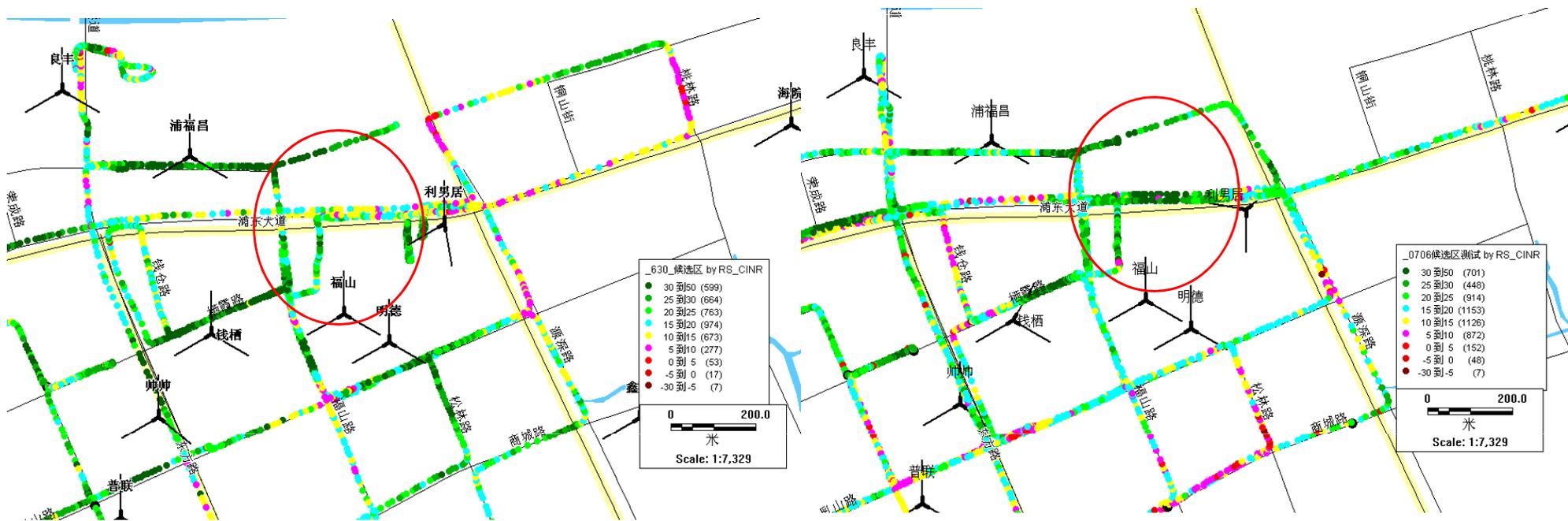


优化前



优化后

移动通信论坛 www.hropt.com
 某区域优化前后CINR覆盖图



优化前

优化后

该区域属密集城区，周围有商务区，密集居民区，厂房以及学校等。先前以下站点周围有建筑物阻挡，影响覆盖，因此进行天线调整，结果如下：

SiteNameCN	CellNameCN	初始值			调整后	
		Height	azimuth	MDownTilt	azimuth	MDownTilt
利男居	利男居_1	24	0	-2	280	2
	利男居_2	24	170	0	50	-4
	利男居_3	24	240	3	180	-4
浦福昌	浦福昌_1	21	0	3	0	-4
	浦福昌_2	21	100	1	110	-1
	浦福昌_3	21	240	1	240	-4
钱栖	钱栖_1	27	0	2	30	-4
	钱栖_2	27	120	7	120	-4
	钱栖_3	27	240	2	240	-2

优化案例3—PCI规划

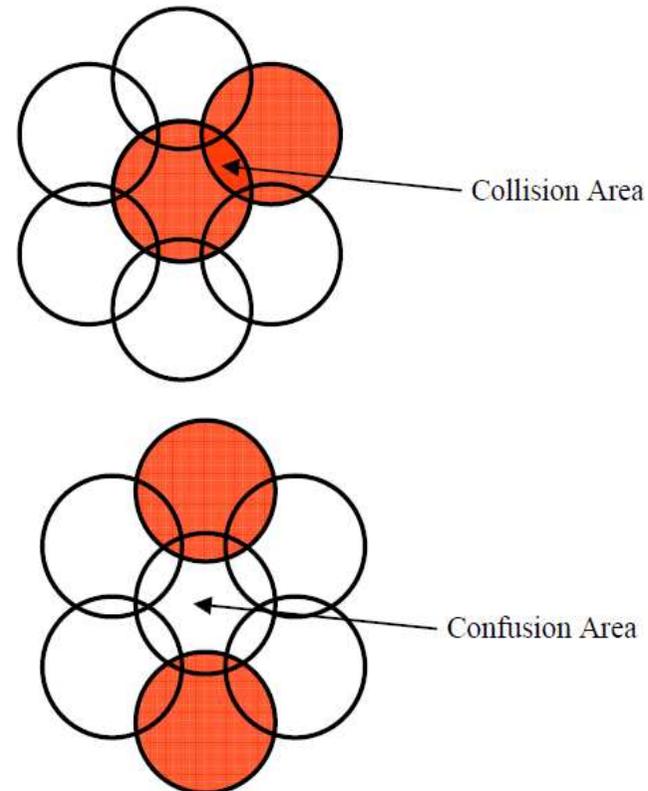
干扰避免措施—PCI规划

PCI 定义:

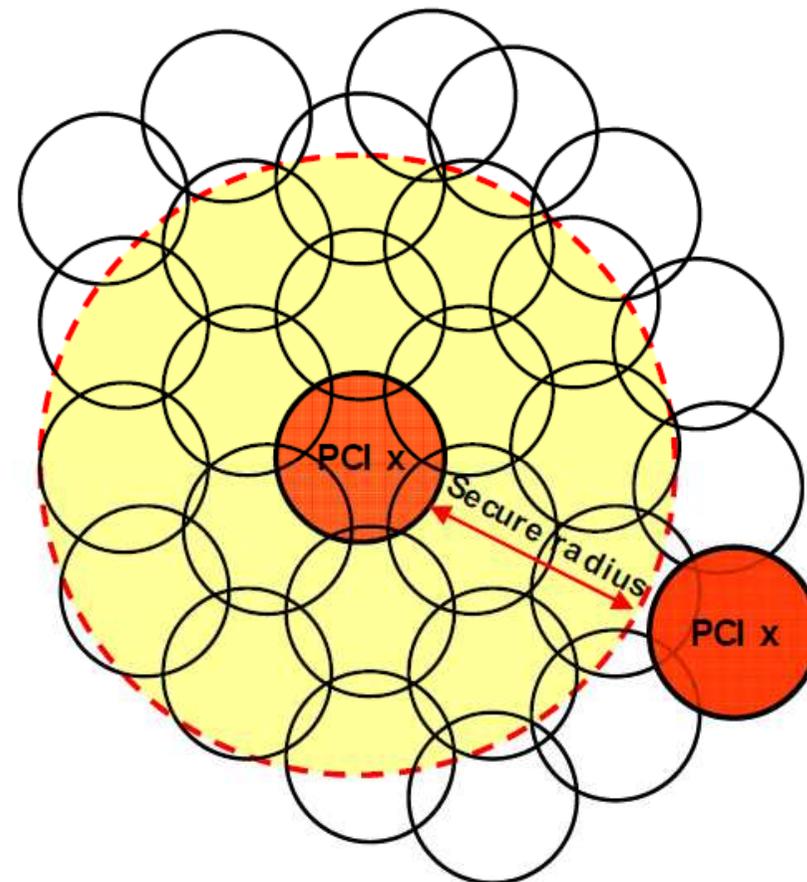
- $PCI : (\text{physicalLayerCellIdentityGroupIndex} * 3) + \text{physicalLayerCellIdentityIndex}$
- **physicalLayerCellIdentityGroupIndex** (0-167 共168)
- **physicalLayerCellIdentityIndex** (0-2共3个)

PCI 规划原则:

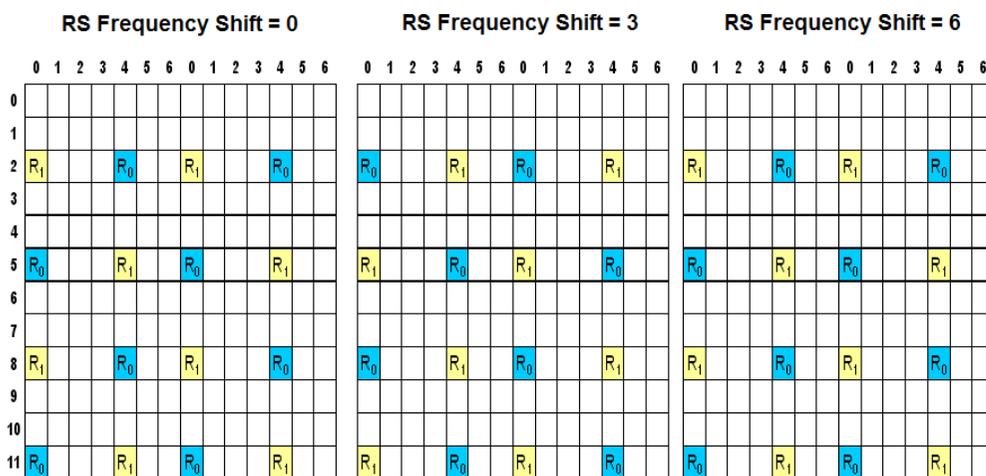
- **collision-free**, 相邻的两个小区 PCI不能相同;
- **confusion-free**, 同一个小区的所有邻区中不能有相同的;



- **PCI重用原则**，复用的PCI应该在足够的安全距离之外
- 安全距离根据网络情况进行适当的调整
- 原则上至少要大于**3倍**的小区覆盖范围



- **RS shifting 原则**，邻小区CRS尽量在频域上分开



➔ MOD 3 MOD 6 规划:

Mod6 – 蓝颜色
 Mod 3 – 蓝颜色&红颜色

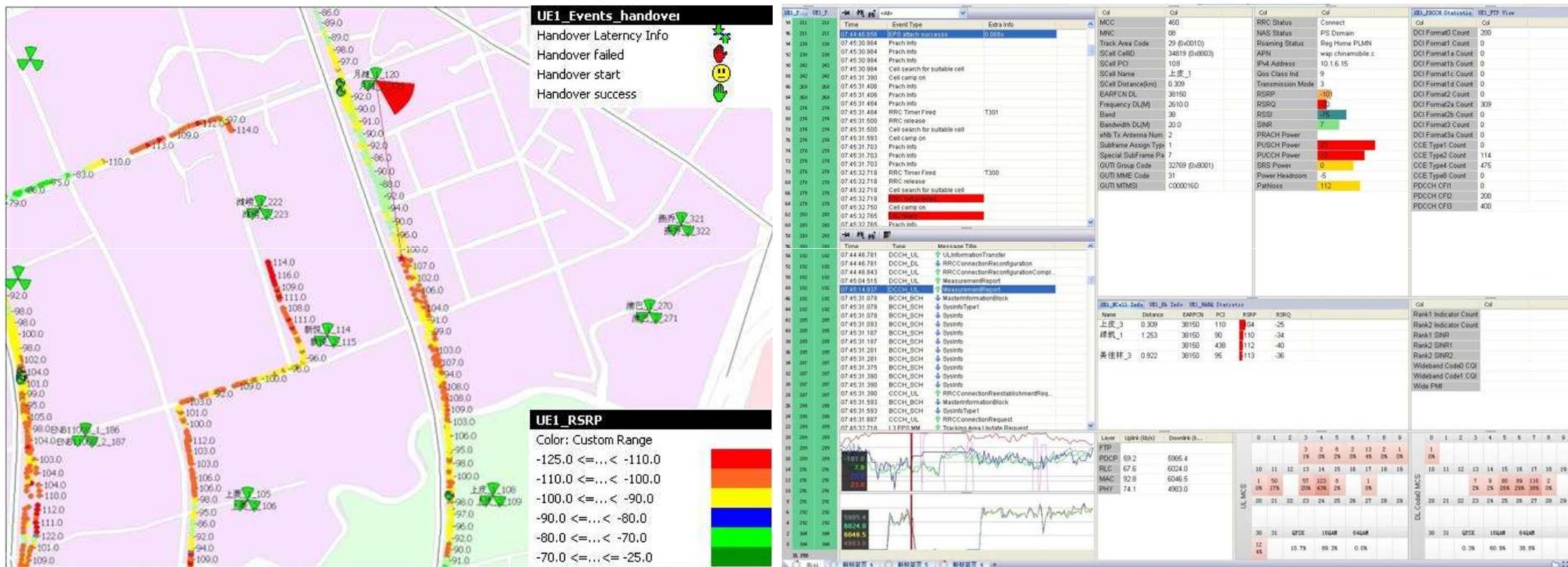
		IDcell of Cell A																					
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22			
IDcell of Cell B	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			
	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			
	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6			
	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7			
	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8			
	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9			
	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11			
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12			
	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13			
	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14			
	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15			
	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16			
	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17			
	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18			
	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19			
	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20			
	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			
	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22			

In this example cells with Cell ID shouldn't be facing Cells with Cell ID 9,12,18...

使用正确的模3模6矩阵规划相邻小区的ID，可以有效的减少CRS的干扰

优化案例4一切换优化

分析和优化措施 - 覆盖问题引起切换失败

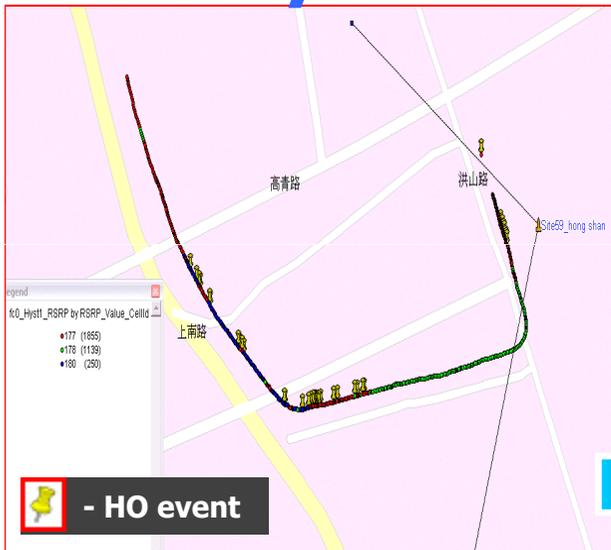


信号（覆盖）问题
 测量上报（MR）问题
 切换带优化问题
 邻区关系问题

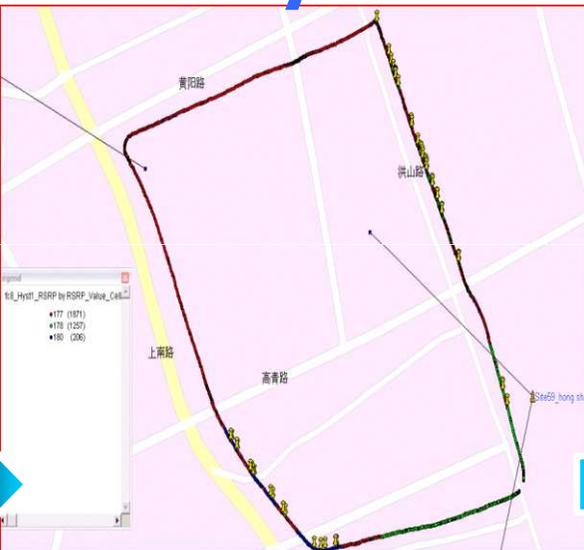
分析
 UE侧已连续发送2条MR，且PUSCH已达最大发射功率
 eNB的trace显示未收到相应测量消息
 小区121、108信号都较弱
 优化措施
 小区108下倾角调整
 小区121下倾角调整
 优化结果
 切换成功

分析和优化措施 - Pingpong切换

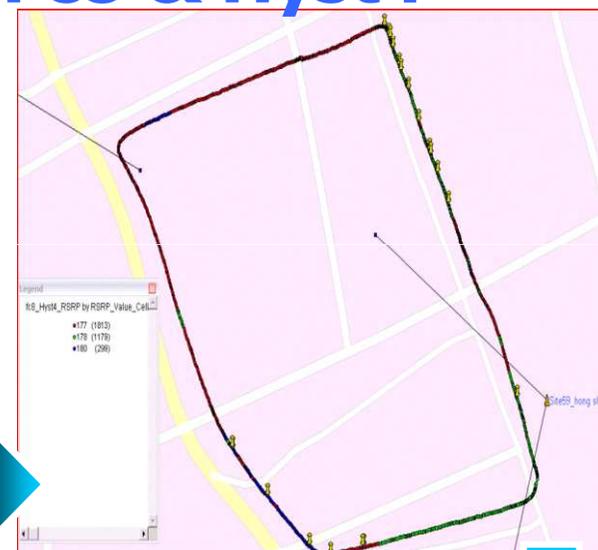
Fc0 & Hyst1



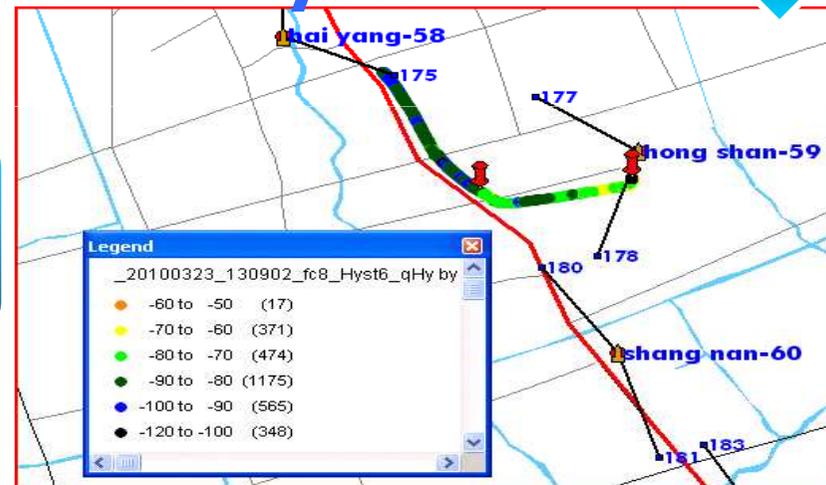
Fc8 & Hyst1



Fc8 & Hyst4



Fc8 & Hyst6



HO Ping-Pong reduced by using fc8&Hyst6



分析和优化措施 - Pingpang切换



分析
小区108、121间存在Pingpong切换
优化措施
EventA3 offset从1dB增加到2dB
Hysteresis从2dB增加到3dB
触发时间由100ms设为256ms

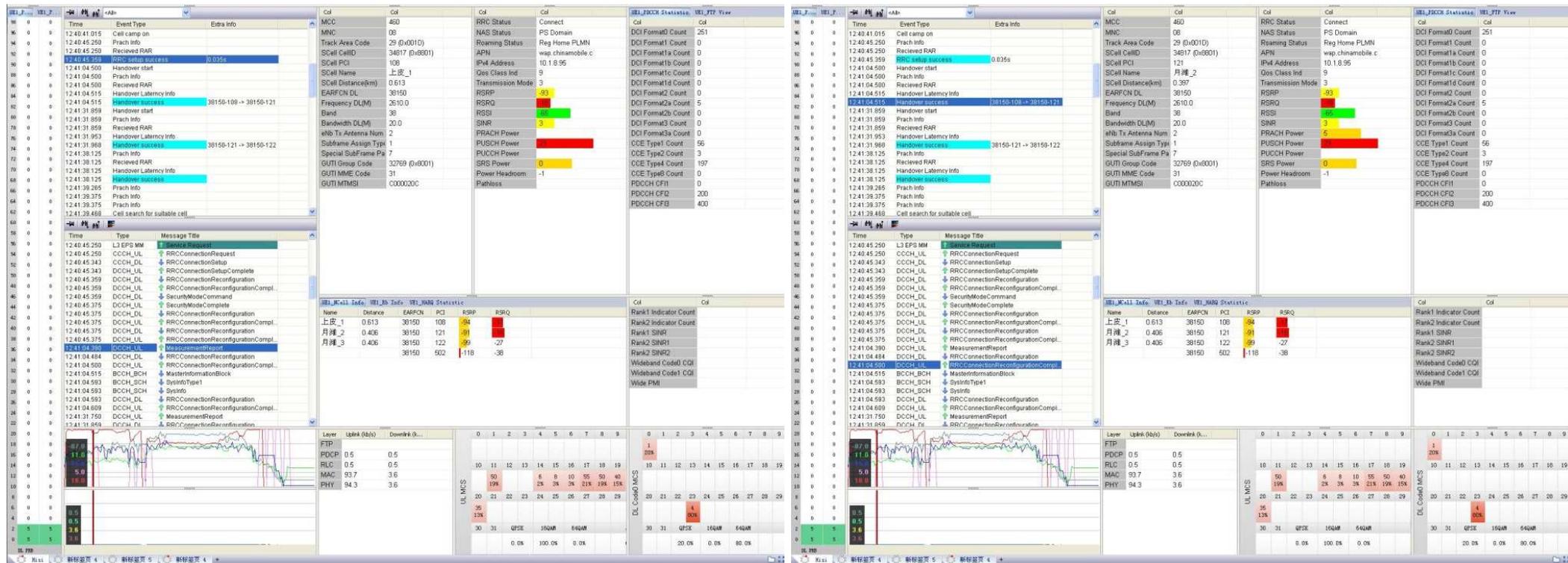
分析和优化措施 - 克服Pingpong切换

优化结果

Ping-pong切换已消除，切换更平稳



优化效果- 108往121成功切换



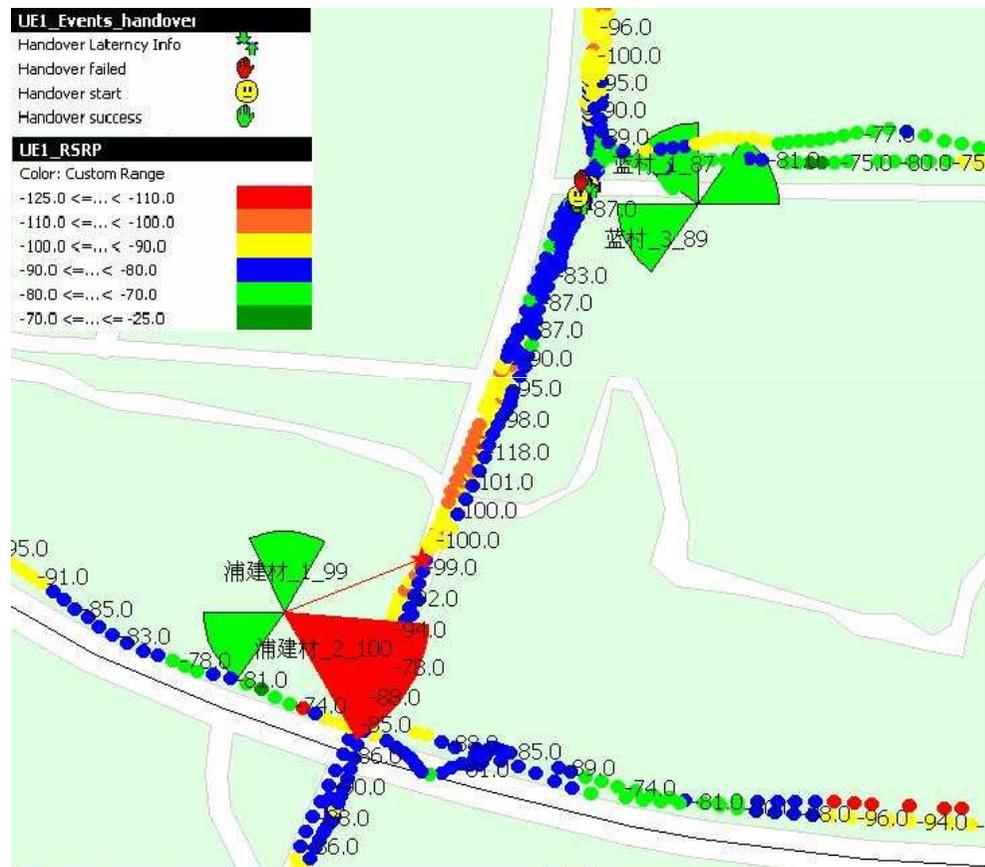
分析和优化措施 - 未配置measConfig问题引起切换失败

Time	Event Type	Extra Info
07:33:20.015	Received RAR	
07:33:20.031	RRC setup success	0.044s
07:33:21.281	EPS attach success	1.228s
07:33:53.750	Prach Info	
07:33:53.843	Prach Info	
07:33:53.843	Cell search for suitable cell	
07:33:54.046	Cell camp on	
07:33:54.046	RRC Connection Reestablishment Request	
07:33:54.046	Prach Info	
07:33:54.062	Prach Info	
07:33:54.156	Prach Info	
07:33:54.156	Received RAR	

Col	Col	Col	Col
MCC	460	RRC Status	Connect
MNC	08	NAS Status	PS Domain
Track Area Code	29 (0x001D)	Roaming Status	Reg Home PLMN
SCell CellID	34051 (0x8503)	APN	wap.chinamobile.c
SCell PCI	100	IPv4 Address	10.1.14.34
SCell Name	浦建村_2	Qos Class Ind	9
SCell Distance(km)	0.086	Transmission Mode	3
EARFCN DL	36150	RSRP	-10
Frequency DL(M)	2610.0	RSRQ	-27
Band	38	RSSI	-56
Bandwidth DL(M)	20.0	SINR	1.1
eNb Tx Antenna Num	2	PRACH Power	23
Subframe Assign Type	1	PUSCH Power	23
Special SubFrame Pa	7	PUCCH Power	21
GUTI Group Code	32769 (0x8001)	SRS Power	0
GUTI MME Code	31	Power Headroom	-9
GUTI MTMSI	CNN0116F	Pathloss	

me	Type	Message Title
33:21.265	DCCH_DL	↓ SecurityModeCommand
33:21.265	DCCH_UL	↑ SecurityModeComplete
33:21.265	DCCH_DL	↓ RRCConnectionReconfiguration
33:21.281	DCCH_UL	↑ RRCConnectionReconfigurationCompl...
33:21.281	L3 EPS MM	↓ Attach Accept
33:21.281	L3 EPS SM	↓ Activate Default EPS Bearer Context Re...
33:21.281	L3 EPS SM	↑ Activate Default EPS Bearer Context Ac...
33:21.281	L3 EPS MM	↑ Attach Complete
33:21.296	DCCH_UL	↑ ULInformationTransfer
33:53.843	BCCH_BCH	↓ MasterInformationBlock
33:53.953	BCCH_SCH	↓ SysInfoType1
33:53.953	BCCH_SCH	↓ SysInfo

Time	Type	Message Title
07:33:19.921	L3 EPS MM	↑ Attach Request
07:33:19.921	CCCH_UL	↑ RRCConnectionRequest
07:33:20.015	DCCH_DL	↓ RRCConnectionSetup
07:33:20.031	DCCH_UL	↑ RRCConnectionSetupComplete
07:33:20.125	DCCH_DL	↓ DLInformationTransfer
07:33:20.125	L3 EPS MM	↓ Identity Request
07:33:20.125	L3 EPS MM	↑ Identity Response
07:33:20.125	DCCH_UL	↑ ULInformationTransfer
07:33:20.125	DCCH_DL	↓ DLInformationTransfer
07:33:20.125	L3 EPS MM	↓ Authentication Request
07:33:20.937	L3 EPS MM	↑ Authentication Response
07:33:20.937	DCCH_UL	↑ ULInformationTransfer
07:33:21.046	DCCH_DL	↓ DLInformationTransfer
07:33:21.046	L3 EPS MM	↓ Security Mode Command
07:33:21.046	L3 EPS MM	↑ Security Mode Complete
07:33:21.046	DCCH_UL	↑ ULInformationTransfer
07:33:21.062	L3 EPS MM	↓ Identity Request
07:33:21.062	L3 EPS MM	↑ Identity Response
07:33:21.062	DCCH_UL	↑ ULInformationTransfer
07:33:21.156	DCCH_DL	↓ UECapabilityEnquiry
07:33:21.156	DCCH_UL	↑ UECapabilityInformation
07:33:21.265	DCCH_DL	↓ SecurityModeCommand
07:33:21.265	DCCH_UL	↑ SecurityModeComplete
07:33:21.265	DCCH_DL	↓ RRCConnectionReconfiguration
07:33:21.281	DCCH_UL	↑ RRCConnectionReconfigurationComplete
07:33:21.281	L3 EPS MM	↓ Attach Accept
07:33:21.281	L3 EPS SM	↓ Activate Default EPS Bearer Context Request
07:33:21.281	L3 EPS SM	↑ Activate Default EPS Bearer Context Accept
07:33:21.281	L3 EPS MM	↑ Attach Complete
07:33:21.296	DCCH_UL	↑ ULInformationTransfer
07:33:53.843	BCCH_BCH	↓ MasterInformationBlock
07:33:53.953	BCCH_SCH	↓ SysInfoType1



未收到eNB下发measConfig

现象
 目标小区已满足MR触发条件，但UE不发MR，UE在源小区挂死，不切往目标小区，并使RSRP比实际信号差。

分析
 UE侧未收到任何eNB下发的Intra/Inter Frequency的测量配置消息
 源小区PCI 100信号已较弱，但UE不测量邻区导致无法切换。
 排查邻区关系和测量配置发现并无问题，怀疑eNB侧切换开关未开启

分析和优化措施 - 未配置measConfig问题引起切换失败

Time	Event Type	Extra Info
19:36:48.692	Handover success	38150-89 -> 38150-87
19:36:55.630	Measurement Report	
19:36:55.630	Handover start	
19:36:55.630	Prach Info	
19:36:55.630	Recieved RAR	
19:36:55.630	Handover Latency Info	
19:36:55.739	Handover success	38150-87 -> 38150-89
19:37:46.817	Measurement Report	
19:37:46.833	Handover start	
19:37:46.833	Prach Info	
19:37:46.927	Recieved RAR	
19:37:46.927	Handover Latency Info	
19:37:46.927	Handover success	38150-89 -> 38150-100
19:38:06.802	Measurement Report	
19:38:06.802	Handover start	

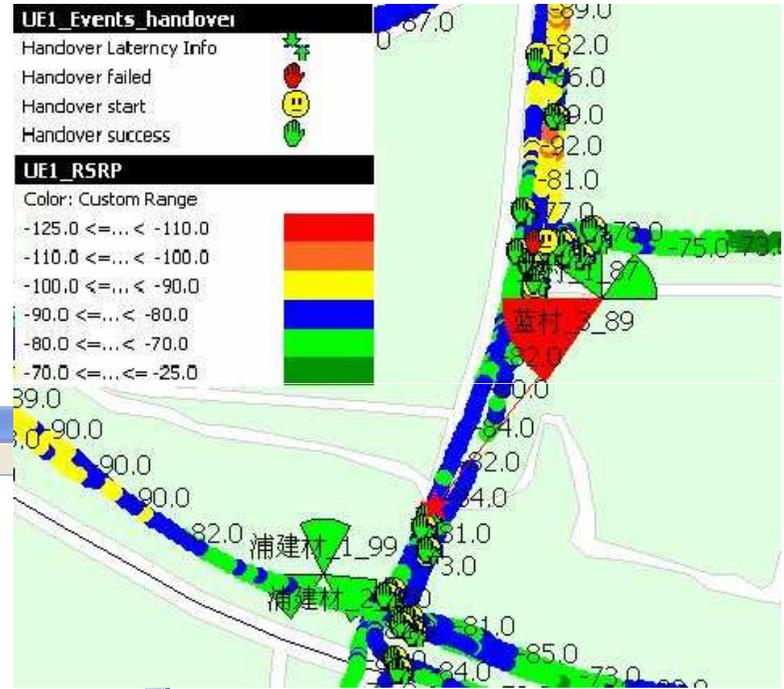
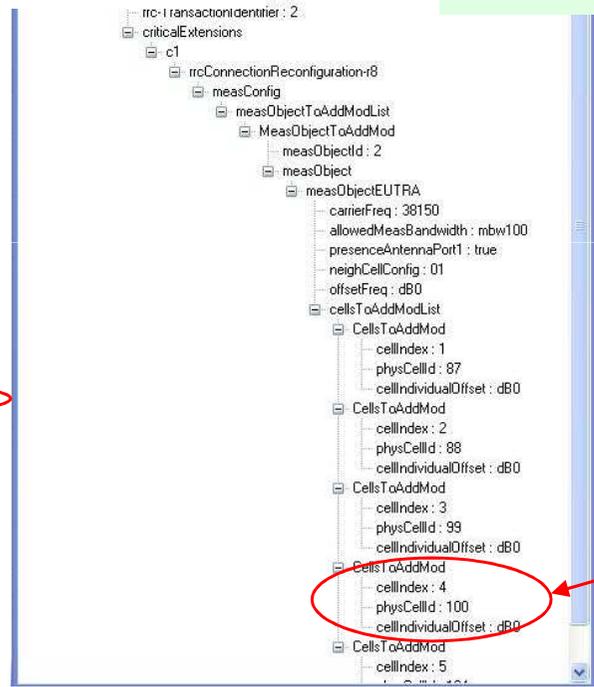
Time	Type	Message Title
19:36:55.739	BCCH_SCH	↓ SysInfoType1
19:37:46.817	DCCH_UL	↑ MeasurementReport
19:37:46.833	DCCH_DL	↓ RRCConnectionReconfiguration
19:37:46.833	DCCH_UL	↑ RRCConnectionReconfigurationCompl...
19:37:46.942	BCCH_BCH	↓ MasterInformationBlock
19:37:46.942	BCCH_SCH	↓ SysInfoType1
19:37:46.942	DCCH_DL	↓ RRCConnectionReconfiguration
19:37:46.958	DCCH_UL	↑ RRCConnectionReconfigurationCompl...
19:37:47.036	BCCH_BCH	↓ MasterInformationBlock
19:37:47.036	BCCH_SCH	↓ SysInfoType1
19:37:47.052	BCCH_SCH	↓ SysInfo
19:38:06.802	DCCH_UL	↑ MeasurementReport
19:38:06.802	DCCH_DL	↓ RRCConnectionReconfiguration
19:38:06.911	DCCH_UL	↑ RRCConnectionReconfigurationCompl...

Col	Col	Col	Col
MCC	460	RRC Status	Connect
MNC	08	NAS Status	PS Domain
Track Area Code	29 (0x001D)	Roaming Status	Reg Home PLMN
SCell CellID	36098 (0x8d02)	APN	wap.chinamobile.c
SCell PCI	100	IPv4 Address	10.1.14.116
SCell Name	浦建村_2	Qos Class Ind	9
SCell Distance(km)	0.112	Transmission Mode	3
EARFCN DL	38150	RSRP	-94
Frequency DL(M)	2610.0	RSRQ	-21
Band	38	RSSI	-54
Bandwidth DL(M)	20.0	SINR	0
eNb Tx Antenna Num	2	PRACH Power	3
Subframe Assign Typs	1	PUSCH Power	7
Special SubFrame Pa	7	PUCCH Power	0
GUTI Group Code	32769 (0x8001)	SRS Power	0
GUTI MME Code	31	Power Headroom	0
GUTI MTMSI	C00002D8	Pathloss	96

UE1_MCell Info	UE1_Rb Info	UE1_HARQ Statistic
Name	Distance	EARFCN
蓝村_3	0.251	38150
浦建村_2	0.118	38150

收到eNB下发
measConfig

Time	Type	Message Title
19:36:06.005	DCCH_UL	↑ SecurityModeComplete
19:36:06.021	DCCH_DL	↓ RRCConnectionReconfiguration
19:36:06.021	DCCH_UL	↑ RRCConnectionReconfigurationComplete
19:36:06.021	DCCH_DL	↓ RRCConnectionReconfiguration
19:36:06.099	DCCH_UL	↑ RRCConnectionReconfigurationComplete
19:36:17.583	DCCH_UL	↑ MeasurementReport
19:36:17.599	DCCH_DL	↓ RRCConnectionReconfiguration
19:36:17.614	DCCH_UL	↑ RRCConnectionReconfigurationComplete
19:36:17.708	BCCH_BCH	↓ MasterInformationBlock
19:36:17.724	BCCH_SCH	↓ SysInfoType1
19:36:17.724	BCCH_SCH	↓ SysInfo
19:36:17.724	DCCH_DL	↓ RRCConnectionReconfiguration
19:36:17.724	DCCH_UL	↑ RRCConnectionReconfigurationComplete
19:36:48.661	DCCH_UL	↑ MeasurementReport
19:36:48.661	DCCH_DL	↓ RRCConnectionReconfiguration
19:36:48.677	DCCH_UL	↑ RRCConnectionReconfigurationComplete
19:36:48.708	BCCH_BCH	↓ MasterInformationBlock
19:36:48.708	BCCH_SCH	↓ SysInfoType1
19:36:48.708	DCCH_DL	↓ RRCConnectionReconfiguration
19:36:48.708	DCCH_UL	↑ RRCConnectionReconfigurationComplete



优化措施
eNB侧Intra/Inter Frequency
mobility开启
优化结果
UE可收到measConfig, 有
Measurement Report, 切换正
常; 信号覆盖也变得正常。

eNB下发的measConfig
包含目标小区

Time	Event Type	Extra Infr
15:31:00.312	Search for specific PLMN	
15:31:00.625	Cell camp on	
15:31:00.625	Prach Info	
15:31:00.625	Received RAR	
15:31:00.718	RRC setup success	0.037s
15:31:00.718	EPS attach success	0.088s
15:32:29.109	Cell search for suitable cell	
15:32:29.312	Cell camp on	
15:32:29.312	RRC Connection Reestablishment Req...	
15:32:29.312	Prach Info	
15:32:29.312	Received RAR	
15:32:29.312	RRC Connection Reestablishment Failed	
15:32:29.312	RRC release	
15:32:29.312	Cell search for suitable cell	

Type	Message Title
1.937	DCCH_UL ↑ UECapabilityInformation
1.953	DCCH_DL ↓ SecurityModeCommand
1.953	DCCH_DL ↓ RRCConnectionReconfiguration
1.953	DCCH_UL ↑ SecurityModeComplete
1.953	DCCH_UL ↑ RRCConnectionReconfigurationCompl...

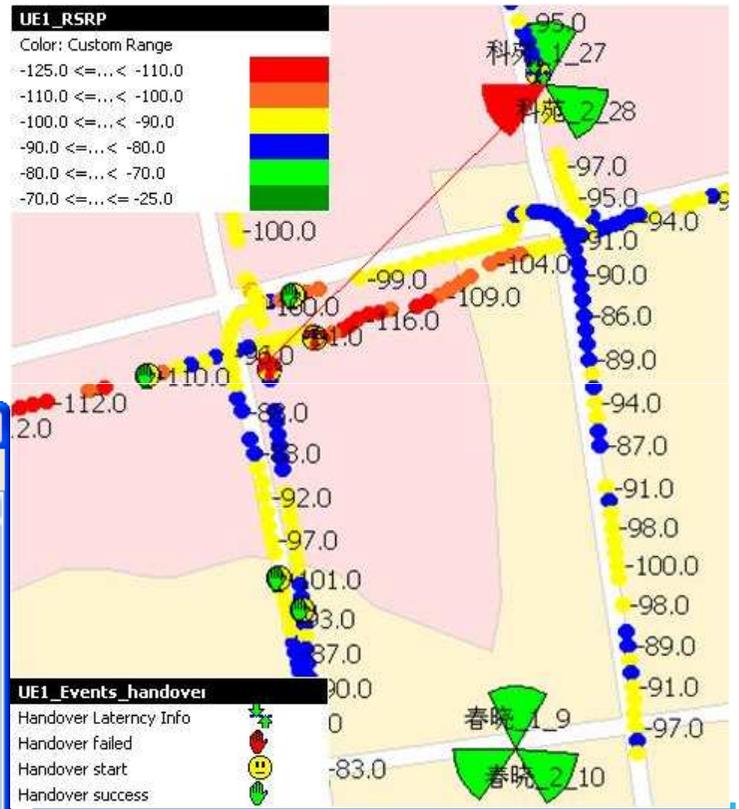
Time	Type	Message Title
15:31:00.625	L3 EPS MM	↑ Attach Request
15:31:00.625	CCCH_UL	↑ RRCConnectionRequest
15:31:00.718	CCCH_DL	↓ RRCConnectionSetup
15:31:00.718	DCCH_UL	↑ RRCConnectionSetupComplete
15:31:00.718	DCCH_DL	↓ RRCConnectionReconfiguration
15:31:00.718	DCCH_UL	↑ RRCConnectionReconfigurationComplete
15:31:00.718	DCCH_DL	↓ DLInformationTransfer
15:31:00.734	L3 EPS MM	↑ Authentication Request
15:31:01.640	L3 EPS MM	↑ Authentication Response
15:31:01.640	DCCH_UL	↑ ULInformationTransfer
15:31:01.734	DCCH_DL	↓ DLInformationTransfer
15:31:01.734	L3 EPS MM	↓ Security Mode Command
15:31:01.734	L3 EPS MM	↑ Security Mode Complete
15:31:01.750	DCCH_UL	↑ ULInformationTransfer
15:31:01.843	DCCH_DL	↓ DLInformationTransfer
15:31:01.843	L3 EPS MM	↑ Identity Request
15:31:01.843	L3 EPS MM	↑ Identity Response
15:31:01.843	DCCH_UL	↑ ULInformationTransfer
15:31:01.937	DCCH_DL	↓ UECapabilityEnquiry
15:31:01.937	DCCH_UL	↑ UECapabilityInformation
15:31:01.953	DCCH_DL	↓ SecurityModeCommand
15:31:01.953	DCCH_DL	↓ RRCConnectionReconfiguration
15:31:01.953	DCCH_UL	↑ SecurityModeComplete
15:31:01.953	DCCH_UL	↑ RRCConnectionReconfigurationComplete
15:31:01.953	L3 EPS MM	↑ Attach Accept
15:31:01.953	L3 EPS SM	↓ Activate Default EPS Bearer Context Request
15:31:01.953	L3 EPS SM	↑ Activate Default EPS Bearer Context Accept
15:31:01.953	L3 EPS MM	↑ Attach Complete
15:31:01.953	DCCH_DL	↓ RRCConnectionReconfiguration
15:31:02.046	DCCH_UL	↑ ULInformationTransfer
15:31:02.046	DCCH_UL	↑ RRCConnectionReconfigurationComplete
15:32:29.203	BCCH_BCH	↓ MasterInformationBlock
15:32:29.218	BCCH_SCH	↓ SysInfoType1

Col	Col	Col	Col
MCC	460	RRC Status	Connect
MNC	08	NAS Status	NULL
Track Area Code	29 (0x001D)	Roaming Status	Not Reg, but Search
SCell CellID	27907 (0x6d03)	APN	wap.chinamobile.c
SCell PCI	29	IPv4 Address	10.1.6.87
SCell Name	科苑_3	Qos Class Ind	9
SCell Distance(km)	0.291	Transmission Mode	7
EARFCN DL	38150	RSRP	-99
Frequency DL(M)	2610.0	RSRQ	-16
Band	38	RSSI	-74
Bandwidth DL(M)	20.0	SINR	8
eNb Tx Antenna Num	2	PRACH Power	6
Subframe Assign Type	1	PUSCH Power	14
Special SubFrame Pa	7	PUCCH Power	5
GUTI Group Code	32769 (0x8001)	SRS Power	23
GUTI MME Code	31	Power Headroom	13
GUTI MTMSI	C000057A	Pathloss	110

UEI_NCell Info	UEI_Rb Info	UEI_HARQ Statistic
Name	Distance	EARFCN
科苑_3	0.291	38150
		PCI
		29
		RSRP
		-99
		RSRQ
		-16


```

rrcConnectionReconfiguration-r8
  measConfig
    measObjectToAddModList
      MeasObjectToAddMod
        measObjectId : 1
          measObject
            measObjectEUTRA
              carrierFreq : 38050
              allowedMeasBandwidth : mbw100
              presenceAntennaPort1 : true
              neighCellConfig : 0x40
              offsetFreq : dB0
            cellsToAddModList
              CellsToAddMod
                cellIndex : 1
                physCellId : 9
                cellIndividualOffset : dB0
              CellsToAddMod
                cellIndex : 2
                physCellId : 11
                cellIndividualOffset : dB0
    
```



已收到eNB下发 measConfig

measConfig中测量频点错误配成了 38050

现象
 UE测不到任何邻区，始终不发MR，挂死在源小区，并使RSRP比实际信号差。

分析
 UE侧已收到eNB下发的Intra/Inter Frequency的测量配置消息
 源小区PCI 29信号已较弱，但UE测不到任何邻区导致无法切换。
 排查切换开关和邻区关系并无问题，怀疑UE测量配置存在问题。
 检查发现measConfig中测量频点错误配置成了38050，而不是当时全网的37900。

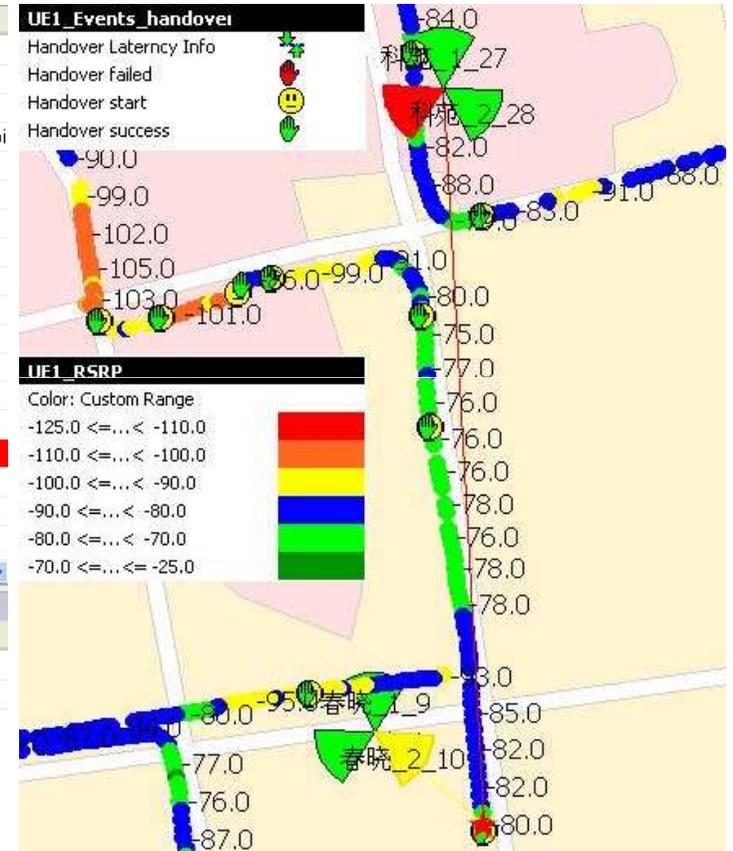
Time	Event Type	Extra Info
19:34:55.281	Received RAR	
19:34:55.281	Handover Latency Info	
19:34:55.296	Handover success	37900-28 -> 37900-29
19:35:52.359	Measurement Report	
19:35:52.375	Handover start	Target PCI: 10
19:35:52.375	Prach Info	
19:35:52.390	Received RAR	
19:35:52.390	Handover Latency Info	
19:35:52.390	Handover success	37900-29 -> 37900-10
19:35:53.828	RRC Connection Reestablishment Start	
19:36:31.593	Measurement Report	
19:36:36.187	Measurement Report	
19:36:36.296	Handover start	Target PCI: 11
19:36:36.312	Prach Info	

Col	Col	Col	Col
MCC	460	RRC Status	Connect
MNC	08	NAS Status	PS Domain
Track Area Code	29 (0x001D)	Roaming Status	Roaming
SCell CellID	30723 (0x7803)	APN	wap.chinamobi
SCell PCI	29	IPv4 Address	10.2.0.254
SCell Name	科苑_3	Qos Class Ind	9
SCell Distance(km)	0.616	Transmission Mode	7
EARFCN DL	37900	RSRP	-85
Frequency DL(M)	2585.0	RSRQ	-21
Band	38	RSSI	-55
Bandwidth DL(M)	20.0	SINR	3
eNb Tx Antenna Num	2	PRACH Power	
Subframe Assign Type	1	PUSCH Power	11
Special SubFrame Pa	7	PUCCH Power	-12
GUTI Group Code	32769 (0x8001)	SRS Power	15
GUTI MME Code	31	Power Headroom	11
GUTI MTMSI	C0000A3F	Pathloss	93

UE1_NCell Info	UE1_Rb Info	UE1_HARQ Statistic
Name	Distance	EARFCN
科苑_3	0.616	37900
春晓_2	0.116	37900


```

message
  c1
    rrcConnectionReconfiguration
      rrc-TransactionIdentifier : 2
      criticalExtensions
        c1
          rrcConnectionReconfiguration-r8
            measConfig
              measObjectToAddModList
                MeasObjectToAddMod
                  measObjectId : 1
                  measObject
                    measObjectEUTRA
                      carrierFreq : 37900
                      allowedMeasBandwidth : mbw100
                      presenceAntennaPort1 : true
                      neighCellConfig : 0x40
                      offsetFreq : dB0
    
```



UE由小区29成功切换至小区10

eNB下发的measConfig中, 测量频点修改为全网使用的37900

优化措施
 修改UE测量配置中的测量频点dIEARFCN为全网当前的37900
优化结果
 UE上报Measurement Report, 由小区29切换至小区10; 信号覆盖也变得正常。

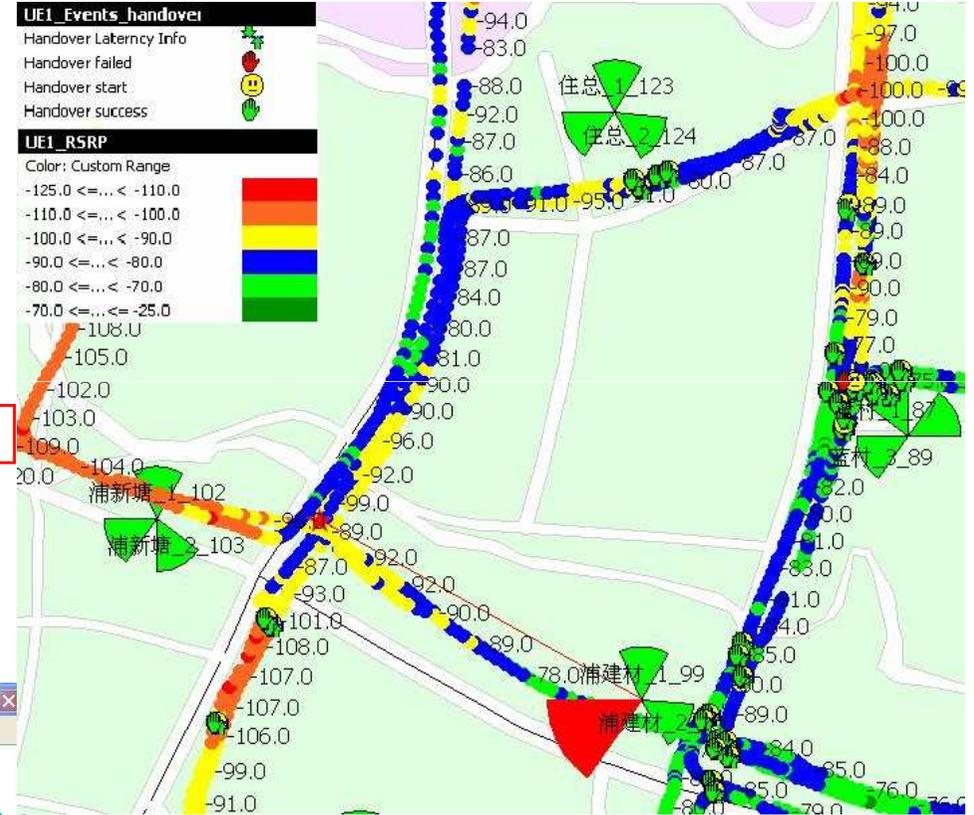
移动通信论坛 www.chinappt.com 邻区关系未添加导致切换失败

Time	Event Type	Extra Info
19:25:07.974	Measurement Report	
19:25:07.974	Handover start	
19:25:08.099	Prach Info	
19:25:08.114	Received RAR	
19:25:08.114	Handover Latency Info	
19:25:08.114	Handover success	38150-100 -> 38150-101
19:26:11.380	Measurement Report	
19:26:12.333	Measurement Report	
19:26:19.927	Measurement Report	
19:26:20.021	Prach Info	
19:26:20.036	Prach Info	
19:26:20.036	Prach Info	
19:26:20.036	Cell search for suitable cell	
19:26:20.442	Cell camp on	
19:26:20.442	RRC Connection Reestablishment	

Col	Col	Col	Col
MCC	460	RRC Status	Connect
MNC	08	NAS Status	PS Domain
Track Area Code	29 (0x001D)	Roaming Status	Reg Home PLMN
SCell CellID	34050 (0x8502)	APN	wap.chinamobile.c
SCell PCI	101	IPv4 Address	10.1.14.116
SCell Name	浦建村_3	Qos Class Ind	9
SCell Distance(km)	0.353	Transmission Mode	3
EARFCN DL	38150	RSRP	
Frequency DL(M)	2610.0	RSRQ	
Band	38	RSSI	-66
Bandwidth DL(M)	20.0	SINR	0
eNb Tx Antenna Num	2	PRACH Power	
Subframe Assign Typ	1	PUSCH Power	22
Special SubFrame Pa	7	PUCCH Power	8
GUTI Group Code	32769 (0x8001)	SRS Power	0
GUTI MME Code	31	Power Headroom	2
GUTI MTMSI	C00002D8	Pathloss	108

UEI_Cell Info	UEI_Rb Info	UEI_Meas Statistic			
Name	Distance	EARFCN	PCI	RSRP	RSRQ
浦建村_3	0.353	38150	101	-95	-23
住总_3	0.488	38150	125	-14	
浦建村_1	0.353	38150	99	-98	-22
		38150	415	05	-27
		38150	356	06	-37
		38150	367	09	-37
美佳林_2	1.047	38150	94	110	-40

UE上报多条MR, 仍未切



详细信息

```

RRC: MeasurementReport
Message type: DCCH_UL
Direction: Uplink
Frame No: 601
Subframe No: 1
Computer Timestamp: 19:26:11.380
uL-DCCH-Message
  message
    c1
      measurementReport
        criticalExtensions
          c1
            measurementReport-r8
              measResults
                measId: 1
                measResultServCell
                  rsrpResult: 47
                  rsrqResult: 21
                measResultNeighCells
                  measResultListEUTRA
                    MeasResultEUTRA
                      physCellId: 125
                      measResult
                        rsrpResult: 52
    
```

UE上报目标小区测量结果

详细信息

```

RRC: RRCConnectionReconfiguration
Message type: DCCH_DL
Direction: Downlink
Frame No: 418
Subframe No: 9
Computer Timestamp: 19:25:08.130
dL-DCCH-Message
  message
    c1
      rrcConnectionReconfiguration
        rrc-TransactionIdentifier: 1
        criticalExtensions
          c1
            rrcConnectionReconfiguration-r8
              measConfig
                measObjectToAddModList
                  MeasObjectToAddMod
                    measObjectid: 2
                    measObject
                      measObjectEUTRA
                        carrierFreq: 38150
                        allowedMeasBandwidth: mbw100
                        presenceAntennaPort1: true
                        neighCellConfig: 01
                        offsetFreq: dB0
                        cellsToRemoveList: 1,2,4
                        cellsToAddModList
                          CellsToAddMod
                            cellIndex: 6
                            physCellId: 100
                            cellIndividualOffset: dB0
                          CellsToAddMod
                            cellIndex: 7
                            physCellId: 103
                            cellIndividualOffset: dB0
    
```

源小区 measConfig 未配置目标小区作为邻区

现象
源小区到目标小区的MR已上报, 但仍不触发切换。

分析
单用户接入, 已排除RAC原因; 检查测量相关配置和切换开关未发现问题, 怀疑是邻区关系未正确添加。查看源小区measConfig, 发现确实未配置UE上报的目标小区的邻区关系。

优化措施
添加相应邻区关系

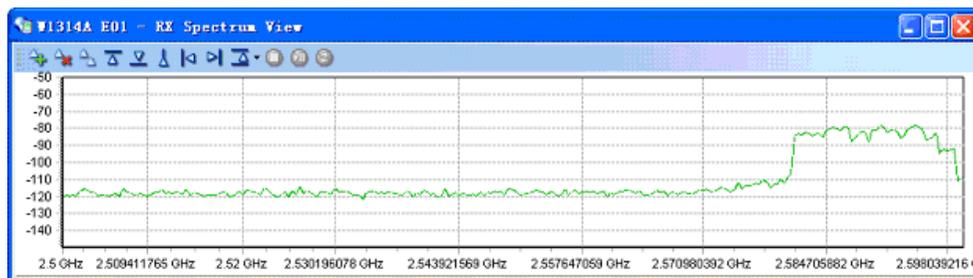
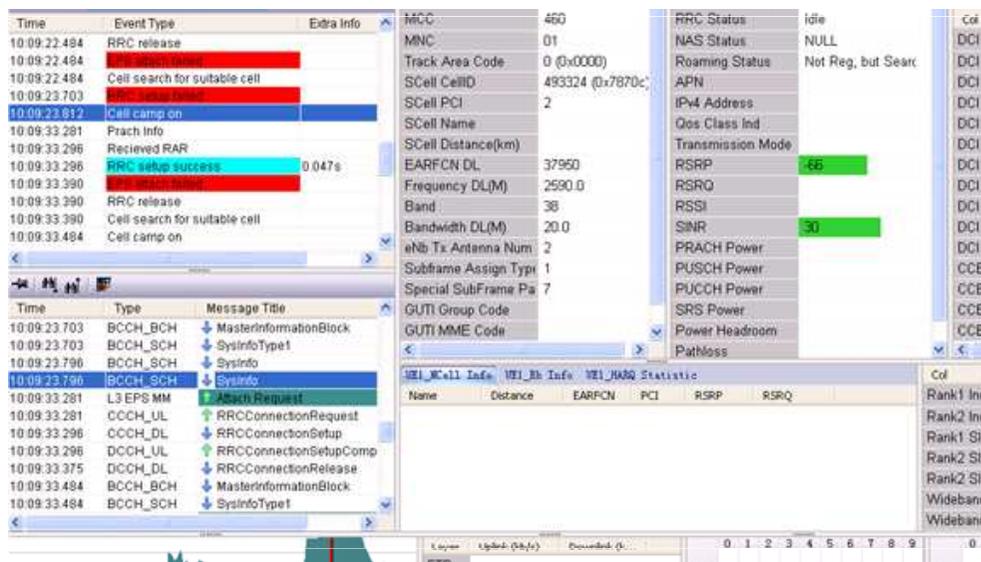
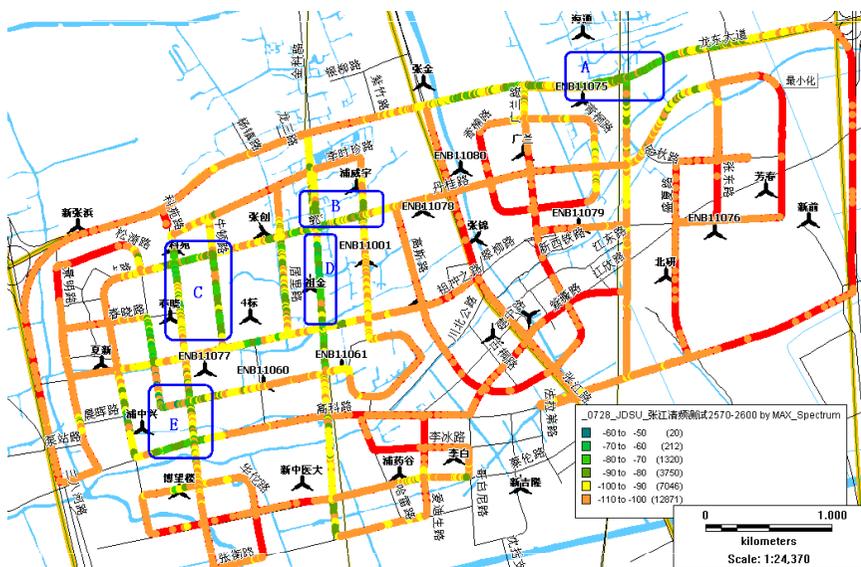
优化结果
切换正常。

优化案例5—干扰问题排查

分析和优化措施 - 干扰导致无法Attach

一发现在张江测试区某站信号**RSRP**和**SNR**比前期测试时低，并且业务信道**BLER**很高，导致在某站无法接入，影响**LTE**网络性能和测试进程。怀疑有干扰。

一关闭测试区域所有基站，进行扫频测试（**2570MHz-2600MHz**），发现张江主测区域遭受某厂商**LTE**信号强干扰，追踪到得信号频点为**2.59G（37950）**，带宽为**20MHz**的干扰信号。最高的干扰到达**RSRP：-66**，**SNR：30**



优化案例6—系统间互操作

核心网漏配对等PLMN导致重选失败

昨天正常的attach accept消息

- Radio priority for TOM8
 - Radio priority level value: (0) Priority level 4 (1=highest,4=lowest)
- Routing area identification
 - Mobile Country Code (MCC): 460
 - Mobile Network Code (MNC): 00
 - Location Area Code (LAC): 43077 (Hex 0xa845)
 - RAC: 0 (Hex 0x0)
- P-TMSI signature
 - P-TMSI signature value: (Hex) e4 cc 0c
- Allocated P-TMSI
 - Odd/even indication: (0) even number of identity digits
 - Type of identity: (4) TMSI/P-TMSI
 - Identity digits (HEX): d0 f0 e7 58
- Equivalent PLMNs
 - Length of PLMN List contents: 6
 - Mobile Country Code (MCC): 460
 - Mobile Network Code (MNC): 08
 - Mobile Country Code (MCC): 460
 - Mobile Network Code (MNC): 00

今天该消息里面没有携带等价PLMN

- Force to standby by value: (0) Force to standby not indicated
- Periodic RA update timer
 - Timer unit: (1) Value is incremented in multiples of 1 minute
 - Timer value: (30) 30 minutes
- Radio priority for SMS
 - Radio priority level value: (4) Priority level 4 (1=highest,4=lowest)
- Radio priority for TOM8
 - Radio priority level value: (0) Priority level 4 (1=highest,4=lowest)
- Routing area identification
 - Mobile Country Code (MCC): 460
 - Mobile Network Code (MNC): 00
 - Location Area Code (LAC): 43077 (Hex 0xa845)
 - RAC: 0 (Hex 0x0)
- P-TMSI signature
 - P-TMSI signature value: (Hex) 71 d0 1c
- Allocated P-TMSI
 - Odd/even indication: (0) even number of identity digits
 - Type of identity: (4) TMSI/P-TMSI
 - Identity digits (HEX): d5 fa 07 40

缺少

优化措施
TDS核心网把LTE核心网配置为对等PLMN
优化结果
重选正常进行

Time	Type	Message Title
15:45:15.684	PCH	↓ pagingType 1
15:45:16.323	PCH	↓ pagingType 1
15:45:16.324	PCH	↓ pagingType 1
15:45:17.603	PCH	↓ pagingType 1
15:45:18.243	PCH	↓ pagingType 1
15:45:18.244	PCH	↓ pagingType 1
15:45:18.884	PCH	↓ pagingType 1
15:45:18.884	PCH	↓ pagingType 1
15:45:19.884	BCCH_BCH	↓ MasterInformationBlock
15:45:20.002	BCCH_SCH	↓ SysInfoType 1
15:45:20.783	BCH	↓ MasterInformationBlock
15:45:21.051	BCH	↓ SysInfoType 7
15:45:21.443	PCH	↓ pagingType 1
15:45:21.444	PCH	↓ pagingType 1
15:45:22.083	PCH	↓ pagingType 1
15:45:22.084	PCH	↓ pagingType 1
15:45:22.723	PCH	↓ pagingType 1

仅读取到SIB1消息

Time	Event Type	Extra Info
15:44:51.646	IRAT measurement start	
15:45:09.010	IRAT (TDS-LTE) reselect start	
15:45:10.104	IRAT (TDS-LTE) reselect failed	
15:45:10.282	IRAT (LTE-TDS) reselect start	
15:45:11.803	IRAT measurement start	
15:45:18.931	IRAT (TDS-LTE) reselect start	
15:45:20.003	IRAT (TDS-LTE) reselect failed	
15:45:20.292	IRAT (LTE-TDS) reselect start	
15:45:21.723	IRAT measurement start	
15:45:28.854	IRAT (TDS-LTE) reselect start	
15:45:29.963	IRAT (TDS-LTE) reselect failed	

重选失败

EARFCN DL(M)	PCI	RSRP	RSRQ
37900	380	-60	-7.5

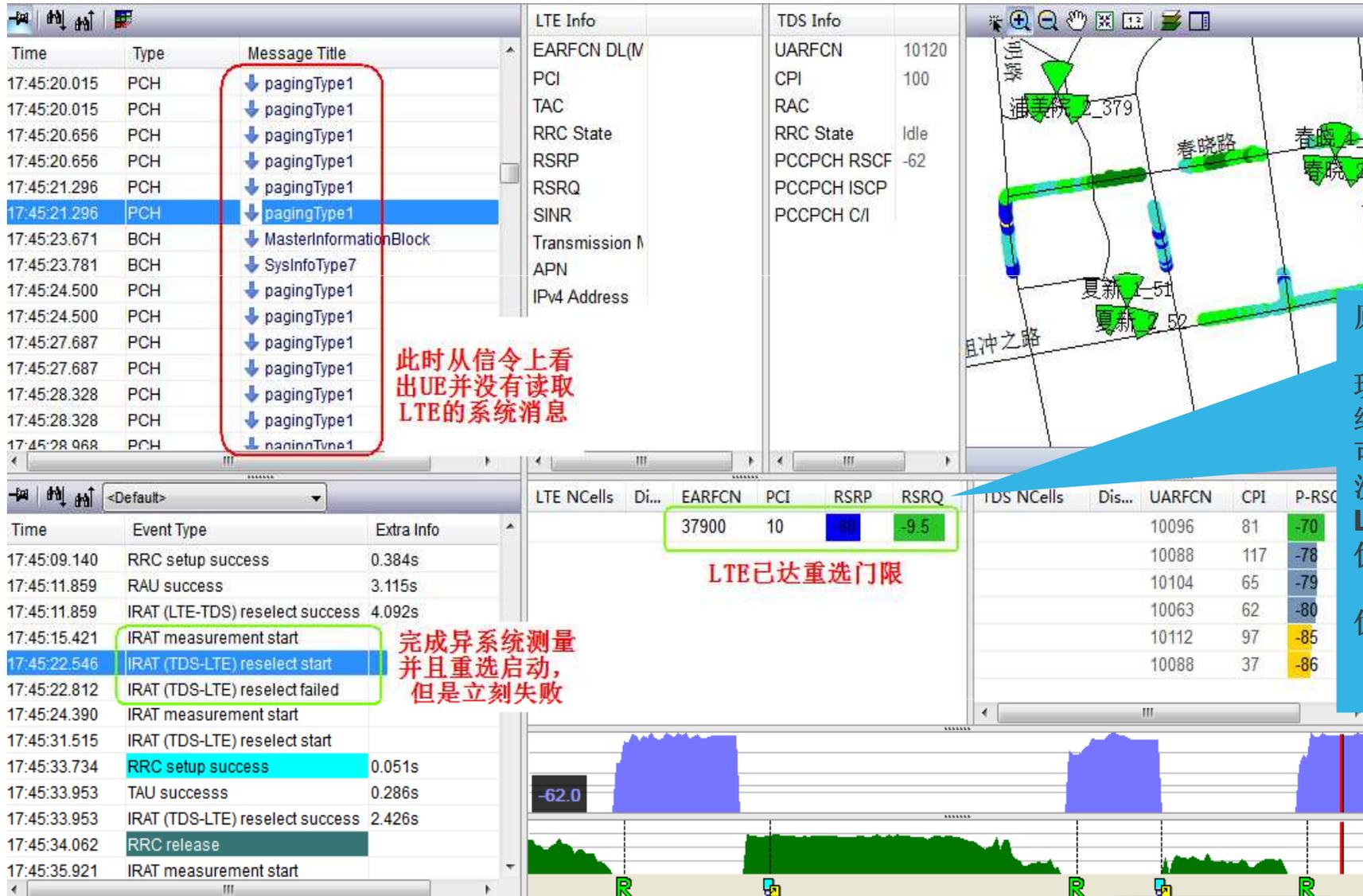
LTE满足重选条件

UE Measurements

EARFCN	PCI	RSRP	RSRQ
10096	70	-60	-7.5



UE问题导致重选失败



此时从信令上看
出UE并没有读取
LTE的系统消息

LTE已达重选门限

完成异系统测量
并且重选启动,
但是立刻失败

原因分析
UE在TDS网络测量发现已经满足重选到LTE网络条件, 并且启动了重选, 可是重选到LTE网络后却没有发现LTE小区或者LTE小区不满足驻留条件

优化措施
升级UE版本

优化结果
重选正常进行

AT
THE
SPEED
OF
IDEAS™

心至·行至