UMTS HSDPA Introduction & Initial Tuning

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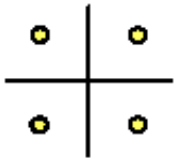
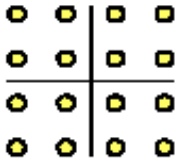
HSDPA Key Techniques – 16QAM

- HSDPA Modulation
  - ⇨QPKS
  - ⇨16QAM



QPSK

2 bits/symbol

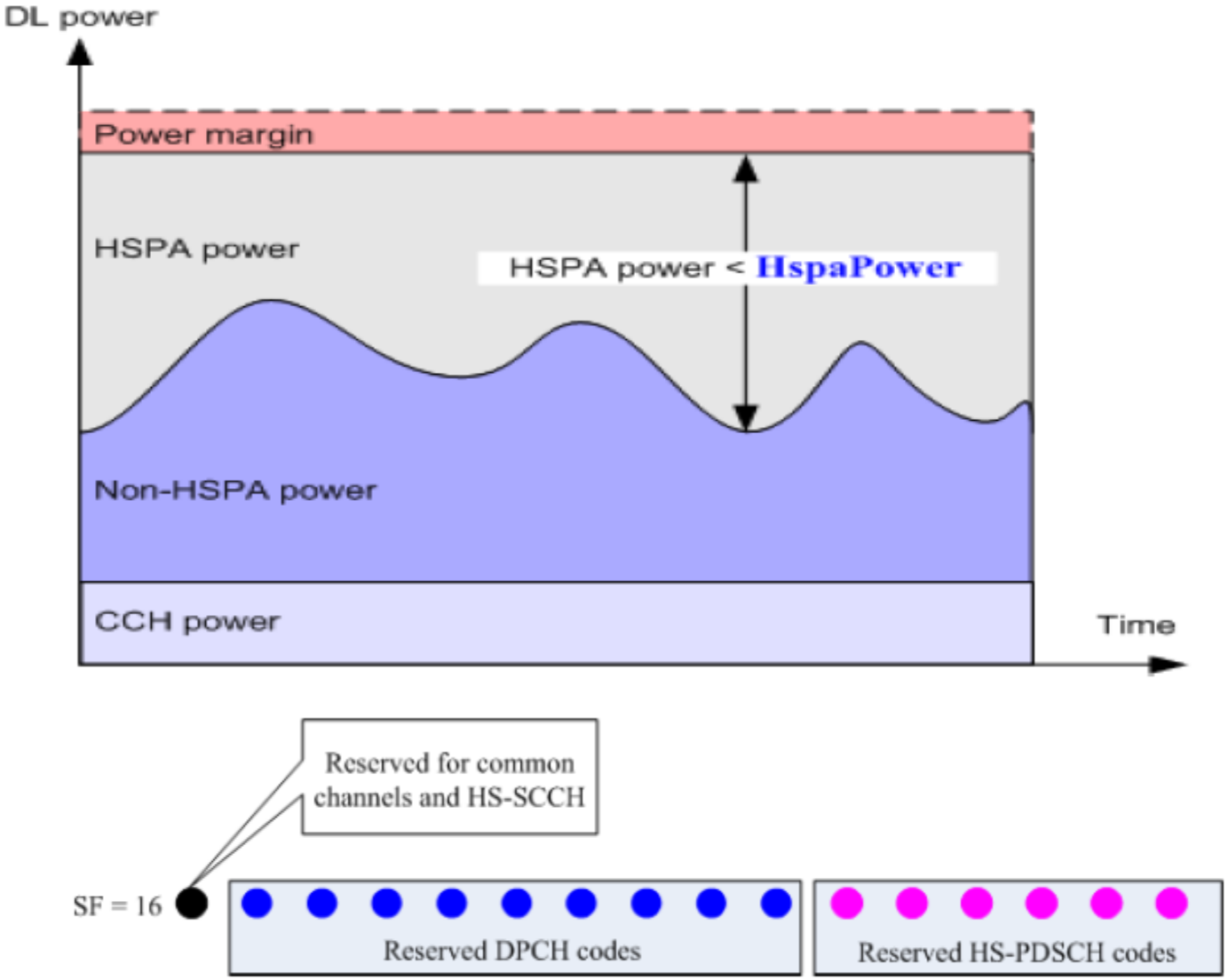


16QAM

4 bits/symbol

Modulation	Coding rate	Throughput with 5 codes	Throughput with 10 codes	Throughput with 15 codes
QPSK	1/4	600 kbps	1,2 Mbps	1,8 Mbps
	2/4	1,2 Mbps	2,4 Mbps	4,8 Mbps
	3/4	1,8 Mbps	3,6 Mbps	5,4 Mbps
16QAM	2/4	2,4 Mbps	4,8 Mbps	7,2 Mbps
	3/4	3,6 Mbps	7,2 Mbps	10,7 Mbps
	4/4	4,8 Mbps	9,6 Mbps	14,4 Mbps

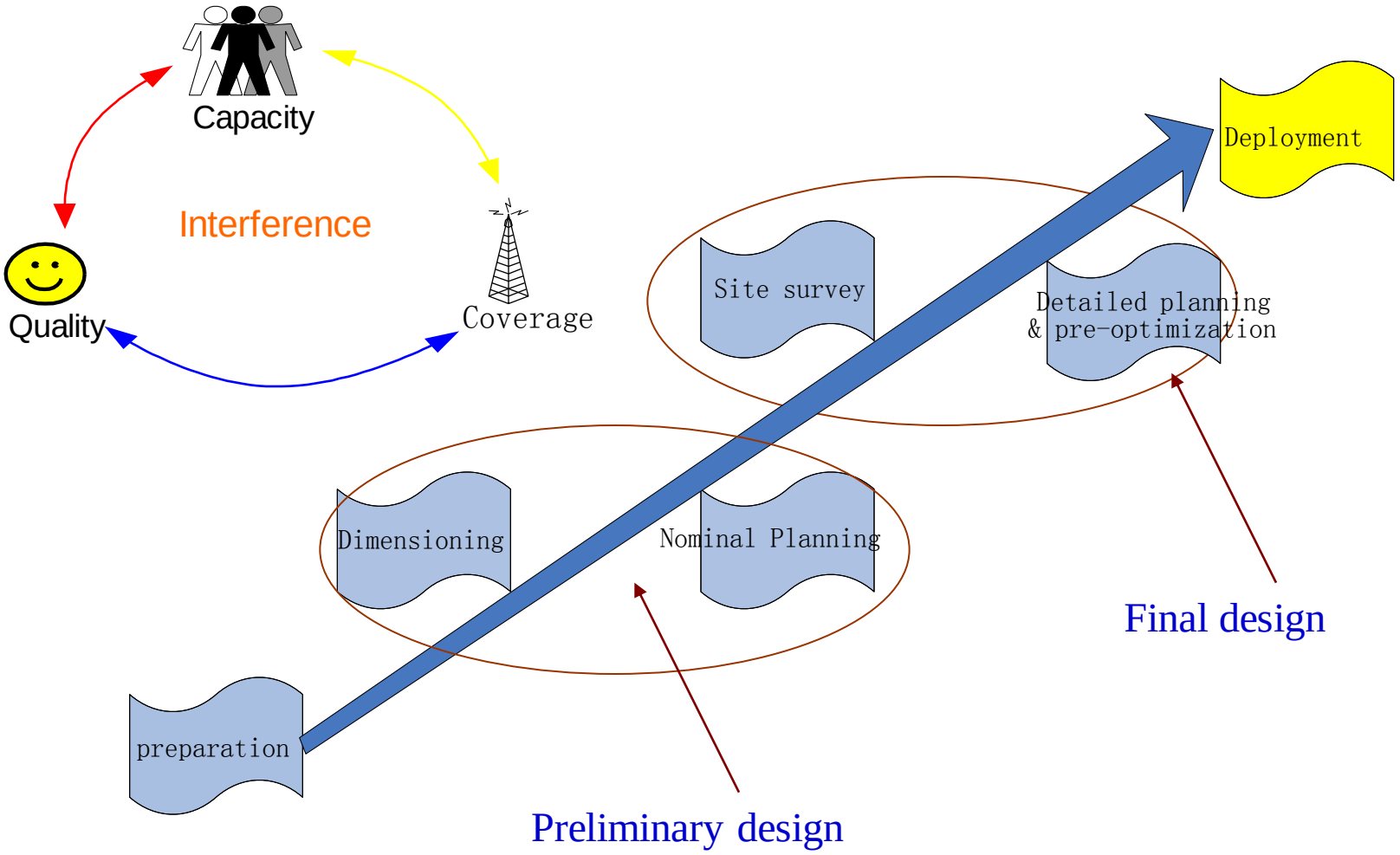
HSDPA Resources Allocation (Power & Code)



Development of 3GPP HSPA and HSPA+

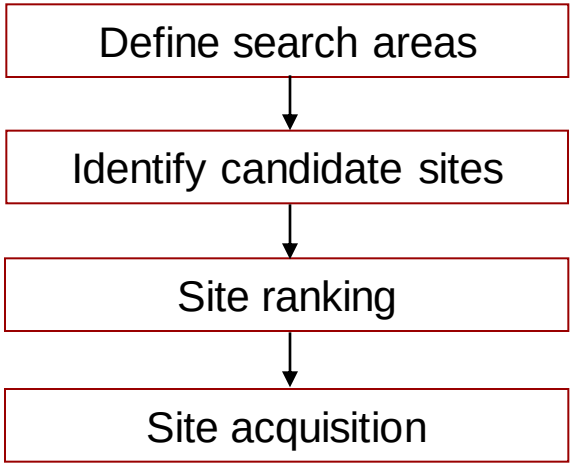
64QAM	Downlink 64QAM allows the use of 64QAM in HSDPA to increase the number of bits per symbol and thus to obtain higher transmission rates. The peak rate at the MAC layer can reach 21 Mbit/s.

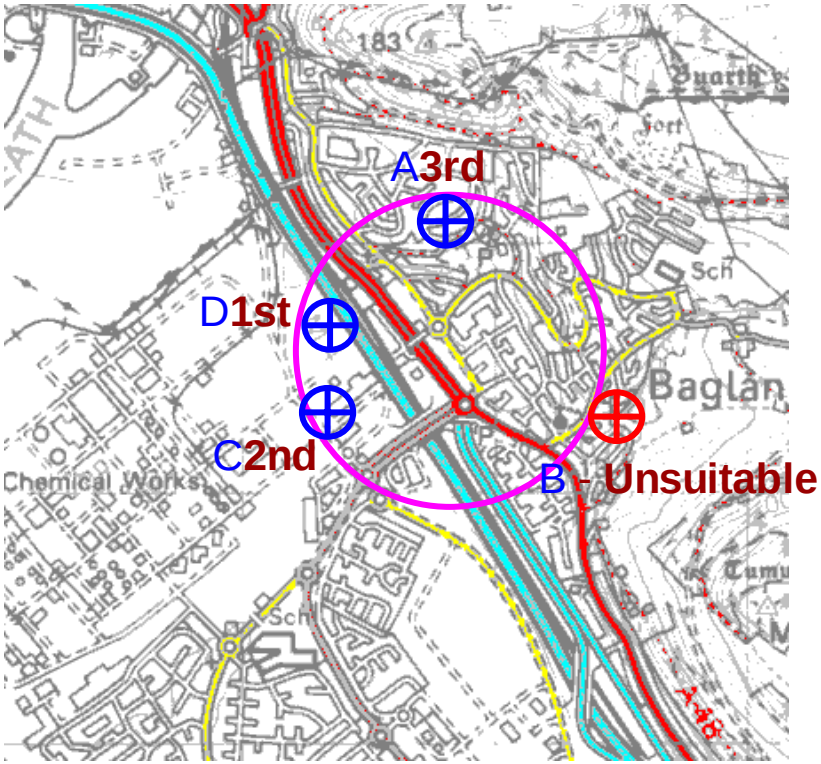
WCDMA RNP procedure overview



Site Survey

- For each theoretical site, a physical site will be acquired in this phase through following steps:





- **A suitable physical site**
  - Give adequate radio coverage.
  - Have connectivity into the transmission network.
  - Be aesthetically and politically acceptable to the local community.
  - Have power nearby, good access and a co-operative owner.

Site Survey report

- The surveyor will prepare a report listing the options, and following items will included in the report:
  - Accurate grid reference.
  - Accurate height of structures or available antenna windows.
  - Photographs of the site.
  - 360° panoramic photos from site or if obstructed from nearby location/structure.

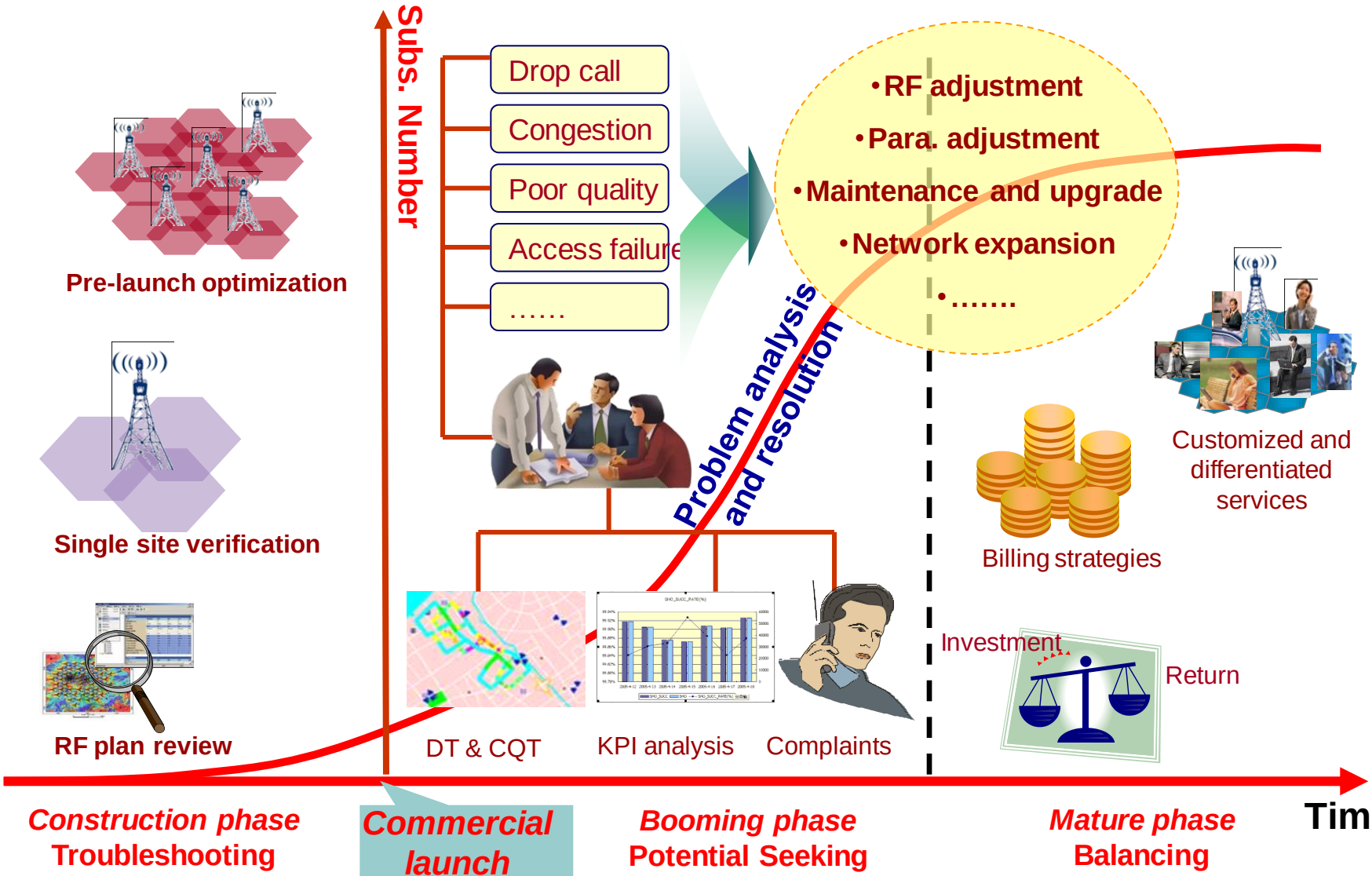
From site survey report, RNP engineers can derive appropriate site location, antenna type, height, azimuth, down tilt, etc.

WCDMA RNP output

After performance verification by simulation, we produce <<XX project RNP report>> with more detailed contents. In order to guide the project implementation, the report should also include following items：

- **LAC, RAC, SAC Plan**
- **Neighbor relation plan (intra-frequency, inter-frequency, and inter-system)**
- **Frequency plan**
- **Scrambling code plan**
- **Power allocation for each channel**
- **Handover parameters**
- **Access control parameters**
- **Other radio parameters**

Optimization throughout Life Cycle

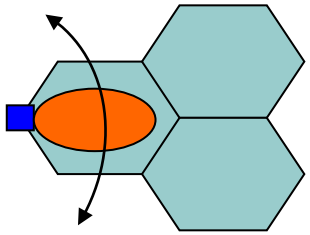


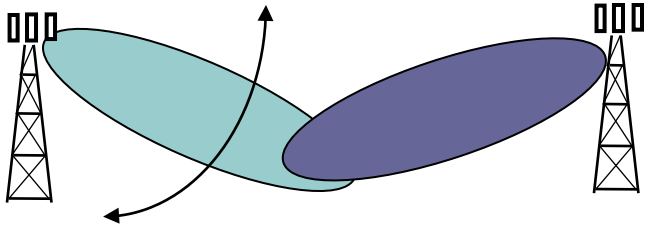
RF Optimization Target

- **To optimize coverage**
- **To minimize pilot pollution**
- **To optimize cell dominance**
- **To optimize neighbor cell list**
- **To resolve RF-related drop calls**

RF Parameters Optimization

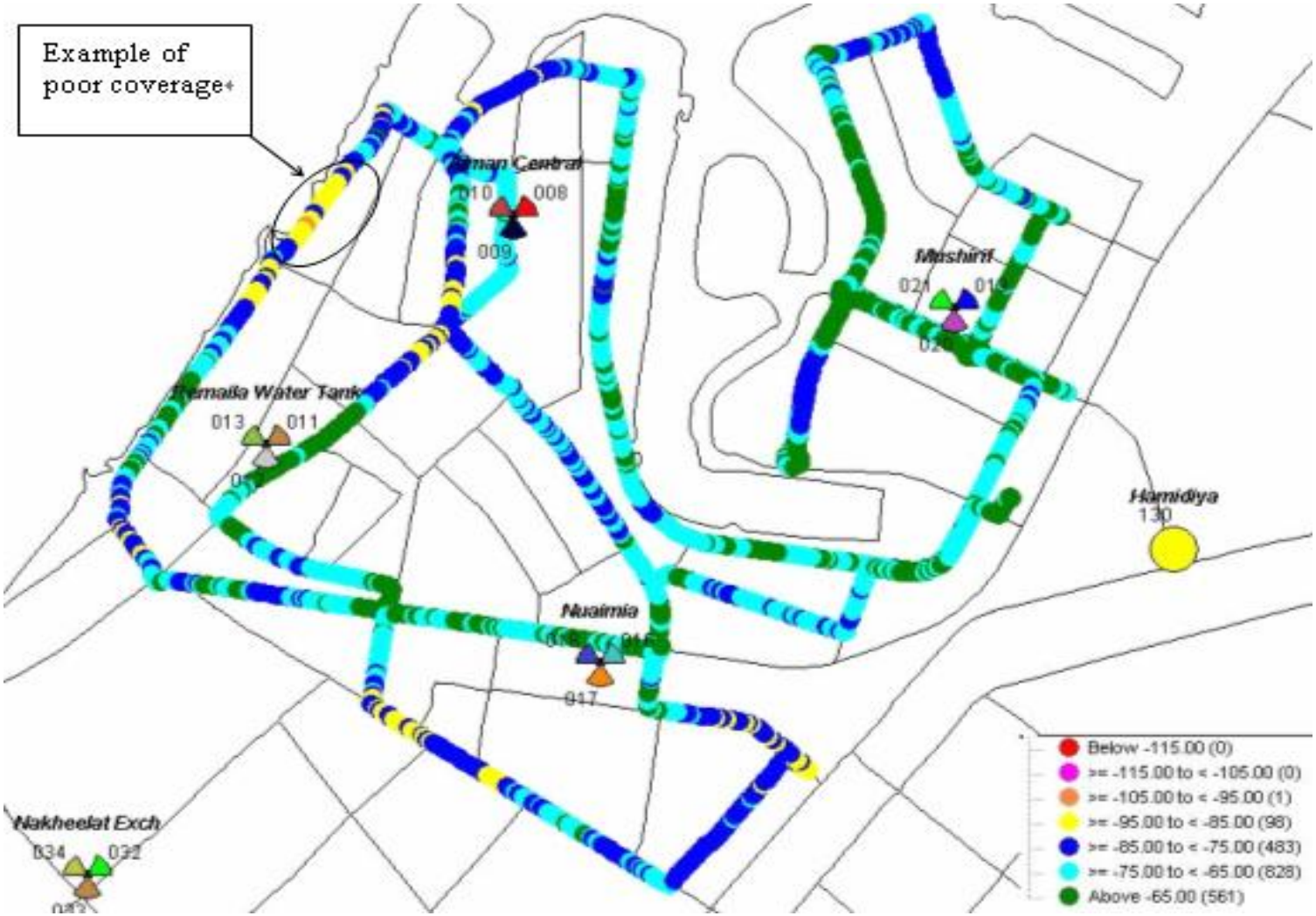
- **Engineering parameters adjustment**
  - To adjust antenna down tilt
  - To adjust antenna azimuth
  - To adjust antenna location
  - To adjust antenna height
  - To replace antenna
  - To replace site
  - To add new cell



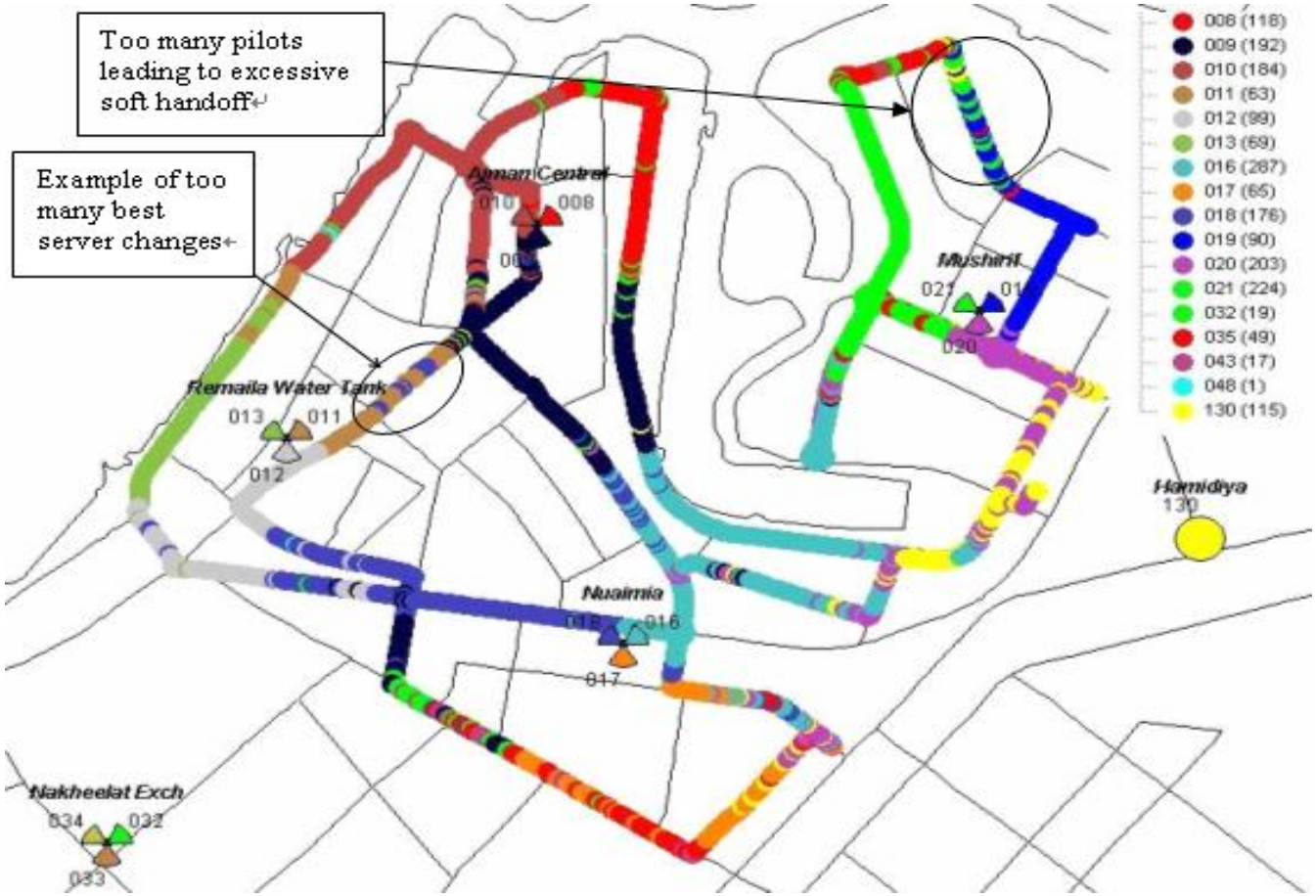


- **Radio part parameters adjustment**
  - To optimize neighbor cell list

Poor Coverage: Example



Poor Cell Dominance: Example

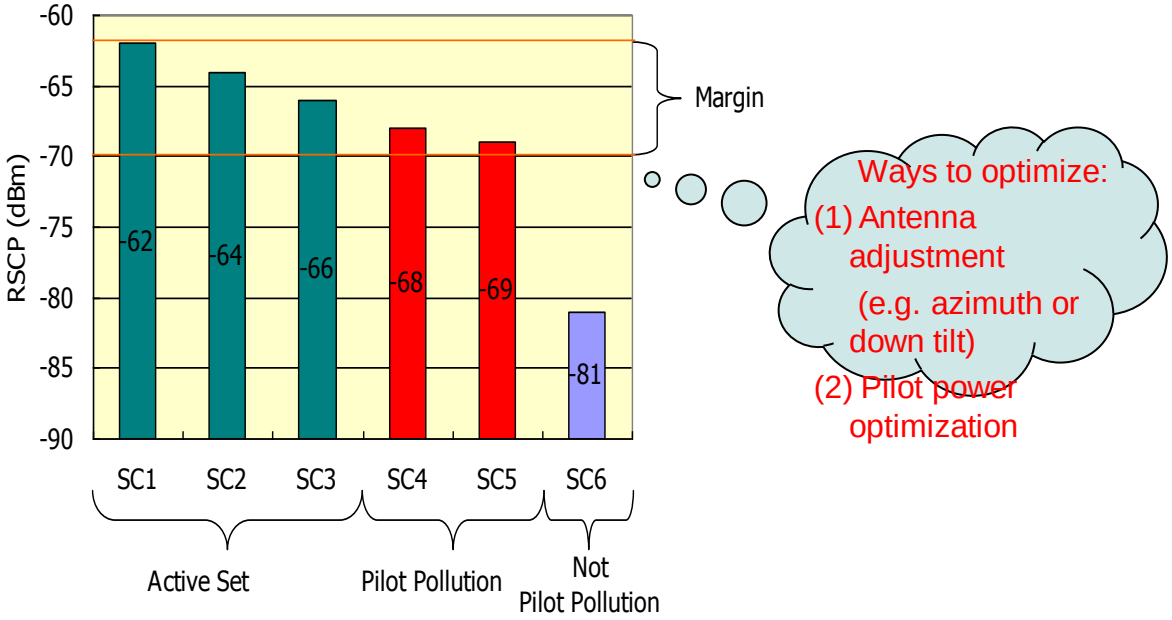


Pilot Pollution Minimization

Pilot pollution definition:

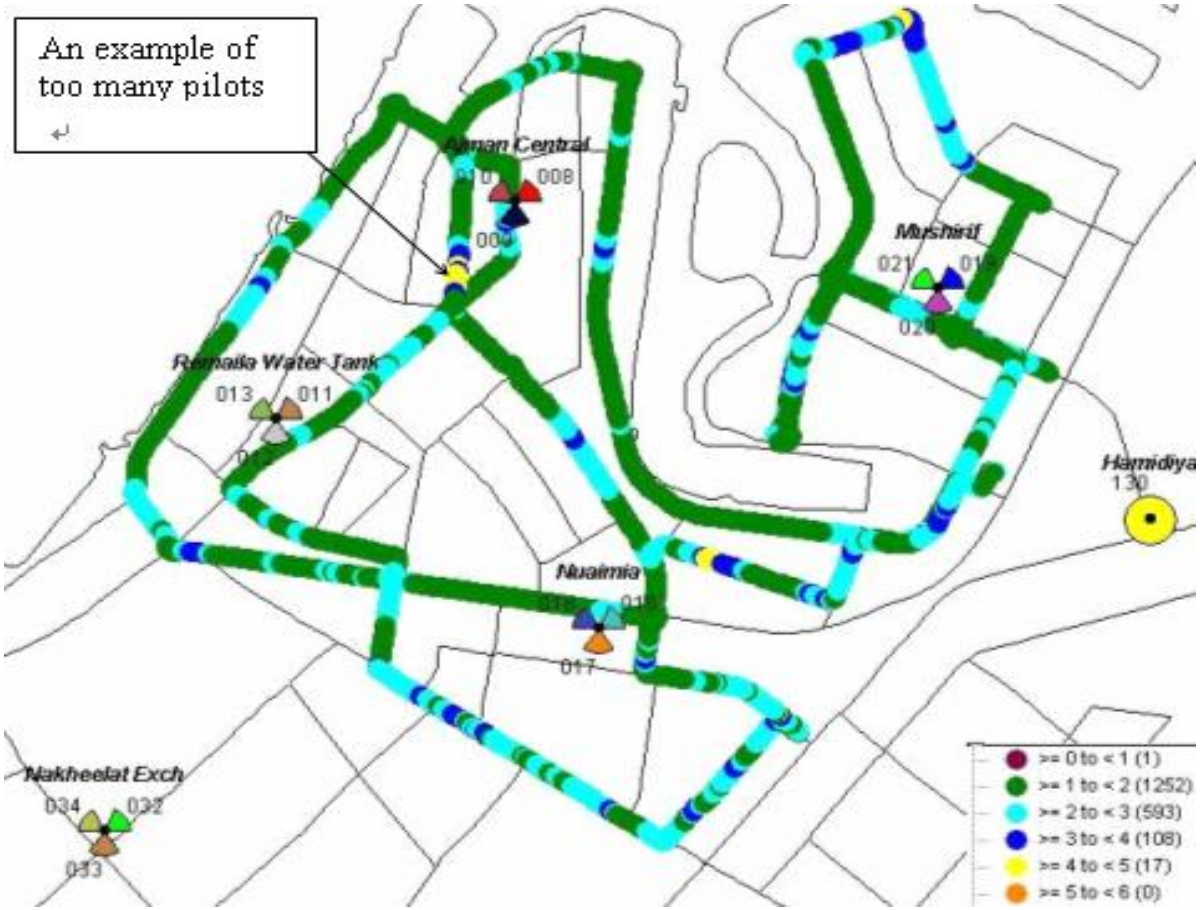
- SHO candidates (A)
- Active set size (B)
- If A>B, pilot pollution exists

Pilot pollution will result in:
(1) low signal quality
(2) decreased system capacity
(3) Call drops easier



Ways to optimize:
(1) Antenna adjustment
(e.g. azimuth or down tilt)
(2) Pilot power optimization

Pilot Pollution: Example



Regular Drive Testing Target

- **To get benchmark of the performance of the network and users' experience**
- **To monitor the progress of on-going optimisation activities**
- **To validate new features of the RAN**
- **To identify degradation in coverage and/or increase in interference**

call setup SR,
call drop rate,
PS throughputs

Routine drive tests should be carried out (e.g. on monthly)

As a result of increased traffic or changes in environment

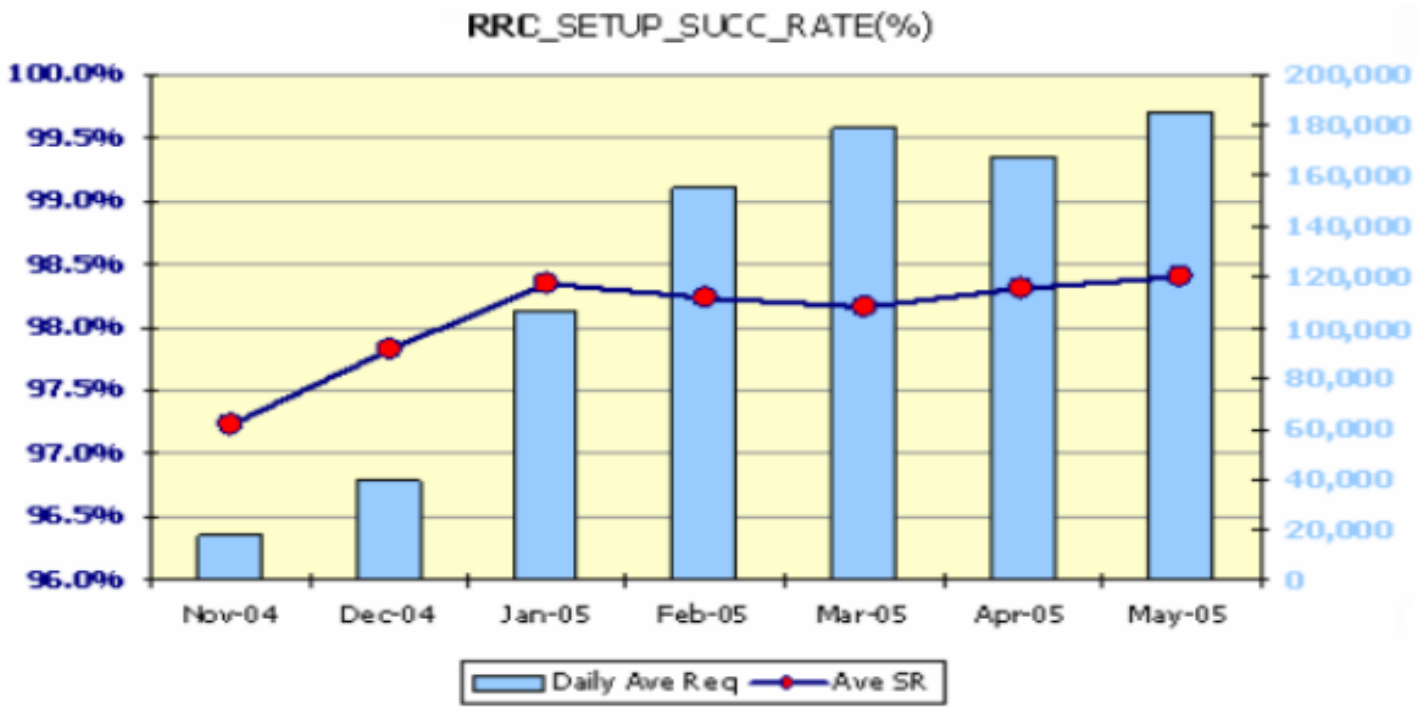
Routine Stats. Analysis Target

- **To benchmark network performance**
- **To monitor traffic volumes & patterns**
- **To assess impact of parameter changes**
- **To identify poorly performing cells**
- **To provide triggers for network upgrade decisions**

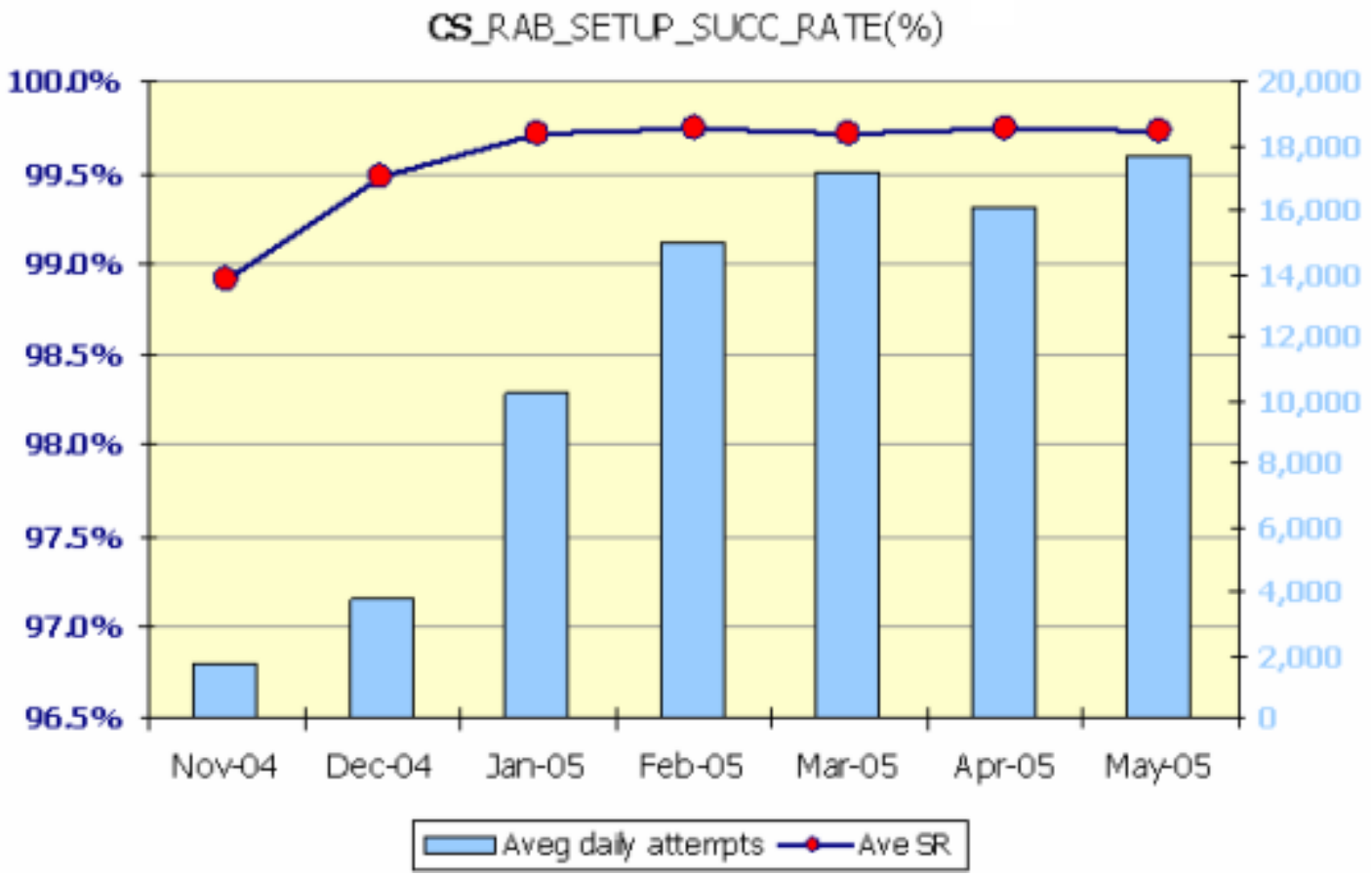
KPI Analysis: RRC Connection setup SR

Main reasons for failed RRC connection setups:

(1) poor coverage; (2) low FACH power



KPI Analysis: CS RAB setup SR



Possible reasons for RAB Setup failures:

(1) poor coverage; (2) no enough resource

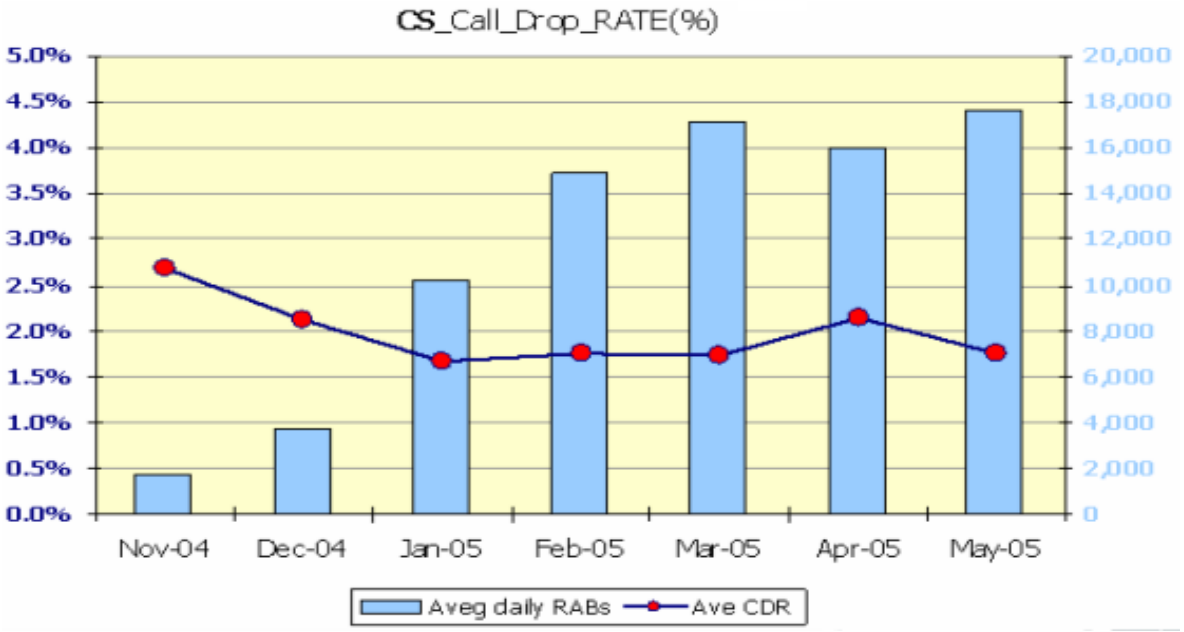
KPI Analysis: CS Drop Calls

Typical reasons for drop calls:

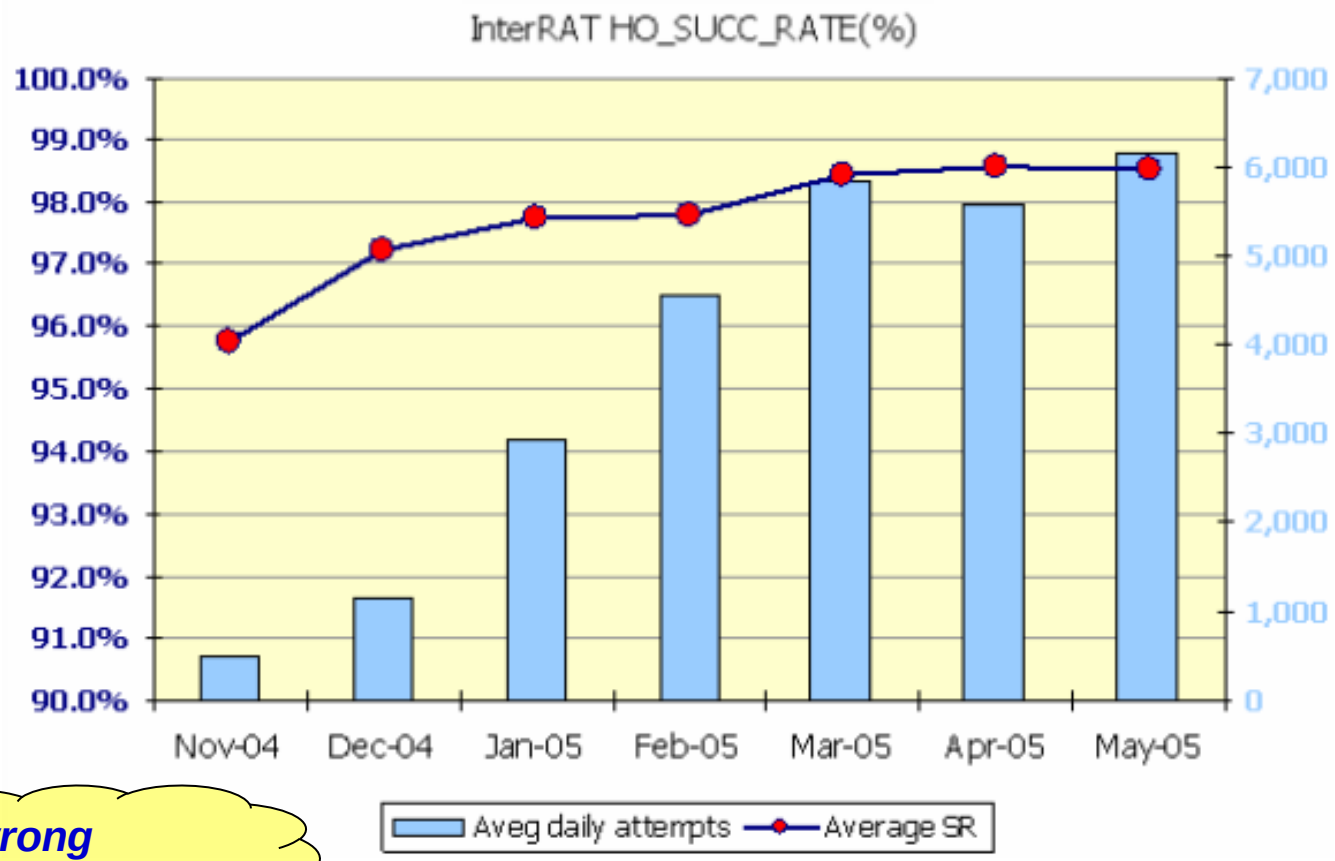
(1) poor coverage (e.g. SRB/TRB reset);

(2) Strong UL/DL interference

(3) Insufficient handover area



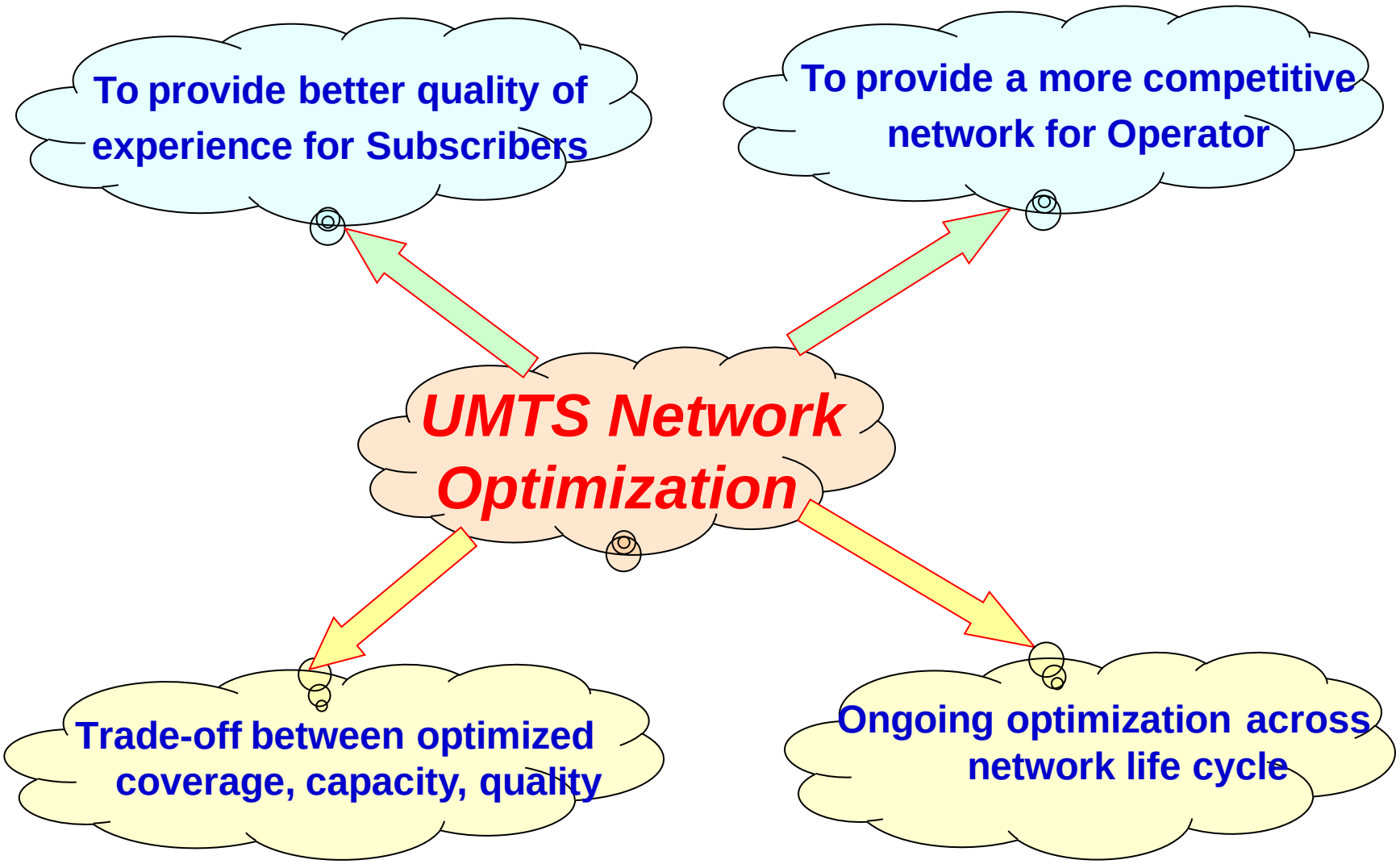
KPI Analysis: Inter-RAT HO SR



e.g. BSIC wrong configured in 3G network

Data discrepancies between 3G network and 2G network have direct impact on inter-RAT HO SR.

Summary


To provide better quality of experience for Subscribers
To provide a more competitive network for Operator
UMTS Network Optimization
Trade-off between optimized coverage, capacity, quality
Ongoing optimization across network life cycle

Thank You

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