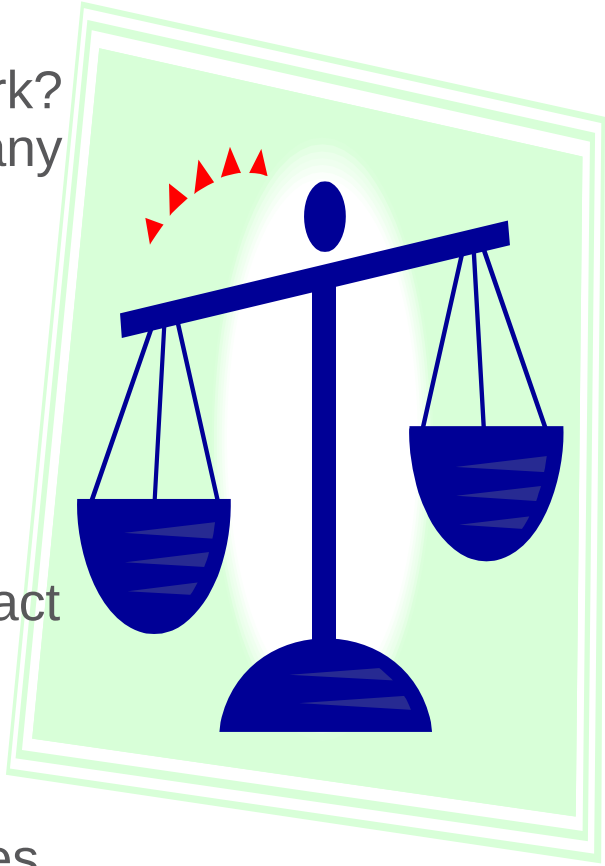
CQM FOR MSS DOMAIN

COMMERCIAL PRESENTATION

CUSTOMER CHALLENGES

- How are the capacity and quality of my MSS network? Does the network perform as I wish? Does it have any problem?
- Where and when is capacity investment in MSS network required and how to balance it with the network performance?
- How do new service and marketing campaigns impact the MSS network capacity and quality?
- How can I keep my MSS network/node and performance related parameter settings and changes up to date?

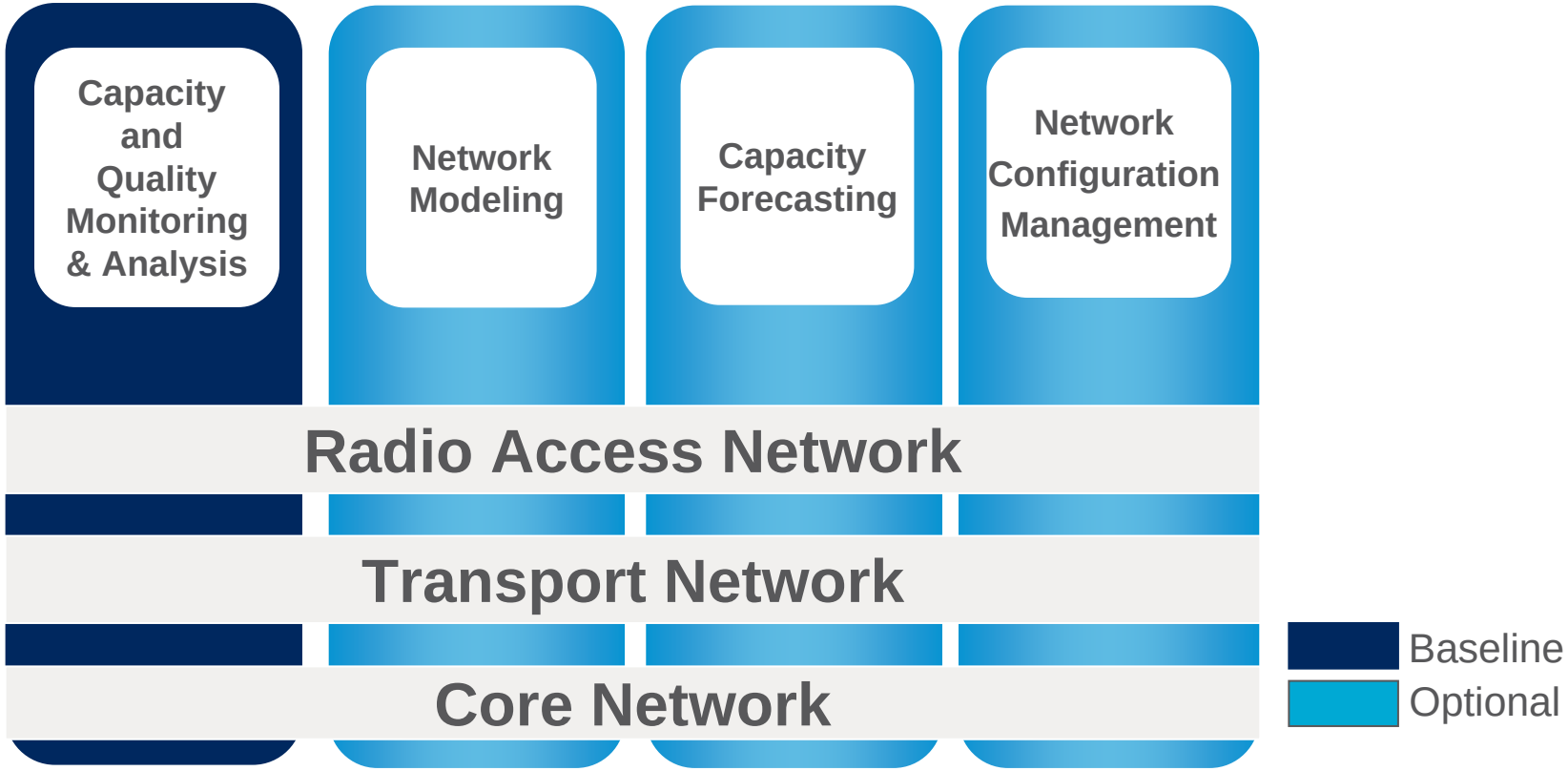


SERVICE VALUE

- Balance the network investment and the network performance
  - Get the whole picture of MSS network capacity & quality, as well as the forecast for future trend
  - Help to make the right decision for MSS network investment
- Better control of network quality, and improve the end-user satisfaction
- Proactively minimize risks for network capacity incidents and poor quality
  - Periodically monitor network situation and give recommendation and analysis of MSS network quality problem
- Control of network/performance related settings and changes
  - Help to keep in pace with the rapid changes and get control of network configuration
- Free your time to focus on core activities
  - Identify bottlenecks causing capacity and quality problems
  - Give efficient methodologies for capacity and quality management
  - Save time to focus on strategic investment and business development

Facilitate the customer to succeed through just in time capacity and quality control and pro-active network planning

ERICSSON APPROACH-THE SERVICE



CQM consist of 4 service modules and serves in holistic network phases
Plan - Build - Operation

ERICSSON APPROACH – THE SERVICE

SERVICE ACTIVITIES

Monitoring & Analysis

- Data Collection
- Short term Trend Analysis
- KPI Monitoring
- Verfication
- Impact Analysis
- Recommendation
- Periodic Reporting

Network Modeling

- Traffic Measurement
- Traffic Model
- Network Topology Build Up
- Network Modeling

Capacity Forecasting

- Long term Trend Analysis
- Network forecast
- Traffic and Network simulation
- Suggestion on Network Expansion and investment

Network Configuration Management

- Network Design Update
- Parameter Control
- Configuration Review and Update

ERICSSON APPROACH-THE SERVICE

CUSTOMER VALUE & CONTENT FOR MSS DOMAIN

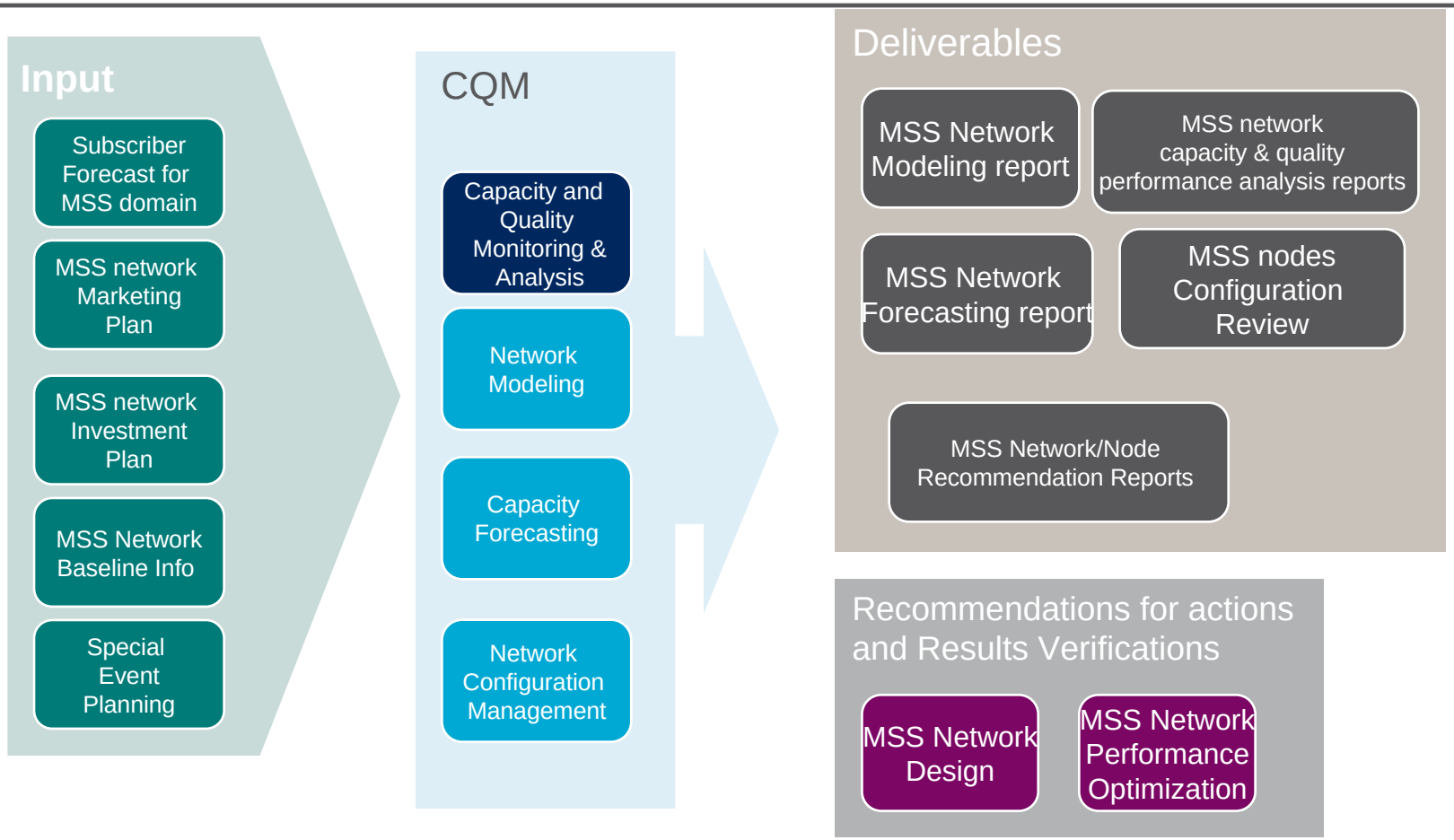
Service Module	Customer Value	Content
Capacity and Quality Monitoring & Analysis	› Just in time status control of MSS network capacity and performance › Minimized risk for revenue impacting events › Understanding of the problem and suggestion for further actions	› Data collection and processing (MSC, MGw, MPBN and other vendors' datacom equipment directly connected to MSS nodes) › KPI Monitoring (for MSC, MGw, MPBN and other vendors' datacom equipment directly connected to MSS nodes) › Impact analysis and recommendations for actions › Trend analysis and recommendations for actions › Action verifications and further analysis › Periodic reporting
Network Modelling	› Control over how Investments would impact MSS network Performance › Assure MSS network capacity availability	› Traffic Measurement based on live network statistical data (usually input from M&A) › Traffic modeling › Network modeling with focus on total cost of ownership (CAPEX and OPEX) and recommendations for actions › MSS Network topology build up

ERICSSON APPROACH-THE SERVICE CONTENT

Service Module	Customer Value	Content
Capacity Forecasting	› Pro-active MSS network planning for revenue assurance › Successful marketing efforts with controlled impacts	› Long term traffic trend analysis and activity planning › Network forecast for both nodes and network level › Traffic simulation based on output of network modeling › Suggestion on network expansion investment
Network Configuration Management	› Well managed MSS network and node SW/HW changes with controlled impacts › Optimized MSS network and node settings for capacity efficiency and controlled performance	› MSS Network Design Update › MSC, MGW related Parameter Control › MSC, MGW configuration review and update › Parameter control, configuration review and updates for nodes of MPBN or other vendors' datacom nodes directly connected to MSS nodes

ERICSSON APPROACH-THE SERVICE

INPUT AND DELIVERABLES FOR MSS DOMAIN



Archive the correct balance between investments and business needs while reducing capacity and quality incidents in your MSS network through a series of deliverables

RELATED SERVICES

- Network Design (ND) service
  - A standalone service which uses CQM service output for new design or updates existing networks.
  - In combination with CQM, the ND service will be based on actual network traffic and enhanced with the methodologies included within the CQM service.
- Network Performance Optimization (NPO) service
  - Focus on trouble shooting, analysis and improvement of the network quality
  - Can run with CQM in parallel, which share the same information by KPI monitoring
- S-LCM service
  - A framework to ensure alignments of the information structure for certain solution for the customer by offering service activities with focus on solution control, evolution planning, and realization of changes.
- CQM & S-LCM combined service
  - Get full scale control of the network and efficient management
  - Get correct balance between network investment and network performance

WHY ERICSSON

As the technical leader in communication world, we also have a long history of the Service area.

- Experiences and references within Ericsson worldwide market and knowledge of Best Practice are accumulated and accessible to the Ericsson consultants.
- Well organized support system, and cooperation across organizations.
- Advanced project management, process and procedure control as well as right competence, tools, team spirits and mind set ensure the sucess of service delivery.

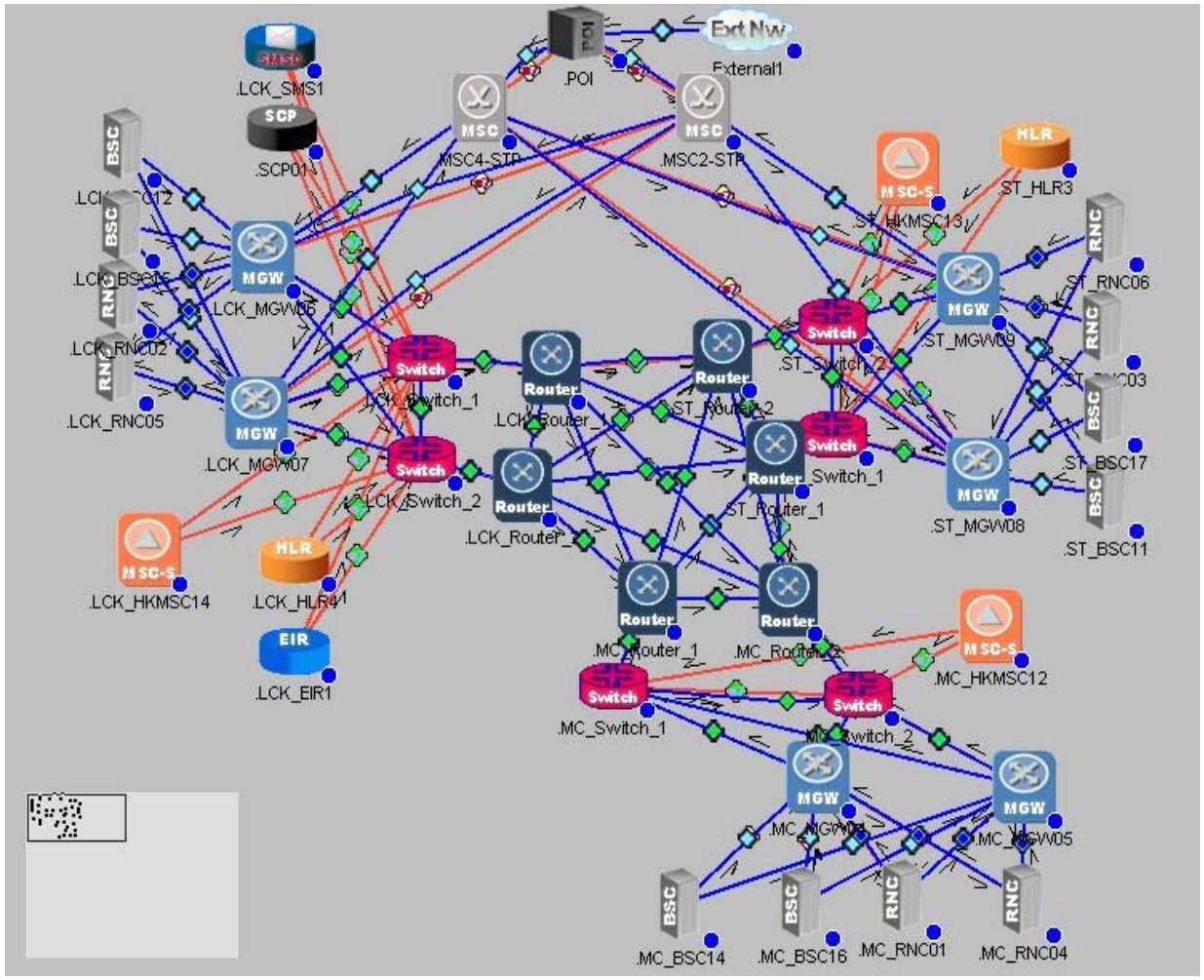
ERICSSON

EXPERIENCE SHARING

NETWORK MODEL

Network Baseline

- MSC Pool
- Iu over ATM vs. Iu over IP



EXPERIENCE SHARING

NETWORK MODEL

INTERFACE	FROM NODE	TO NODE	TRANSPORT TYPE	LOAD (Erlang)
Other	LCK_MGW06	LCK_Switch_1	IP	2165.7
Other	LCK_MGW06	LCK_Switch_2	IP	2165.7
Other	LCK_MGW07	LCK_Switch_1	IP	2165.7
Other	LCK_MGW07	LCK_Switch_2	IP	2165.7
Other	MC_MGW04	MC_Switch_1	IP	2362.9
Other	MC_MGW04	MC_Switch_2	IP	2362.9
Other	MC_MGW05	MC_Switch_1	IP	2362.9
Other	MC_MGW05	MC_Switch_2	IP	2362.9
Other	ST_MGW08	ST_Switch_1	IP	2030.6
Other	ST_MGW08	ST_Switch_2	IP	2030.6
Other	ST_MGW09	ST_Switch_1	IP	2030.6
Other	ST_MGW09	ST_Switch_2	IP	2030.6
Iu over IP				
Other	LCK_MGW06	LCK_Switch_1	IP	2778.6
Other	LCK_MGW06	LCK_Switch_2	IP	2778.6
Other	LCK_MGW07	LCK_Switch_1	IP	2778.6
Other	LCK_MGW07	LCK_Switch_2	IP	2778.6
Other	MC_MGW04	MC_Switch_1	IP	1290.5
Other	MC_MGW04	MC_Switch_2	IP	1290.5
Other	MC_MGW05	MC_Switch_1	IP	1290.5
Other	MC_MGW05	MC_Switch_2	IP	1290.5
Other	ST_MGW08	ST_Switch_1	IP	2430.0
Other	ST_MGW08	ST_Switch_2	IP	2430.0
Other	ST_MGW09	ST_Switch_1	IP	2430.0
Other	ST_MGW09	ST_Switch_2	IP	2430.0

More traffic on MGW6/7/8/9

Less traffic on MGW4/5

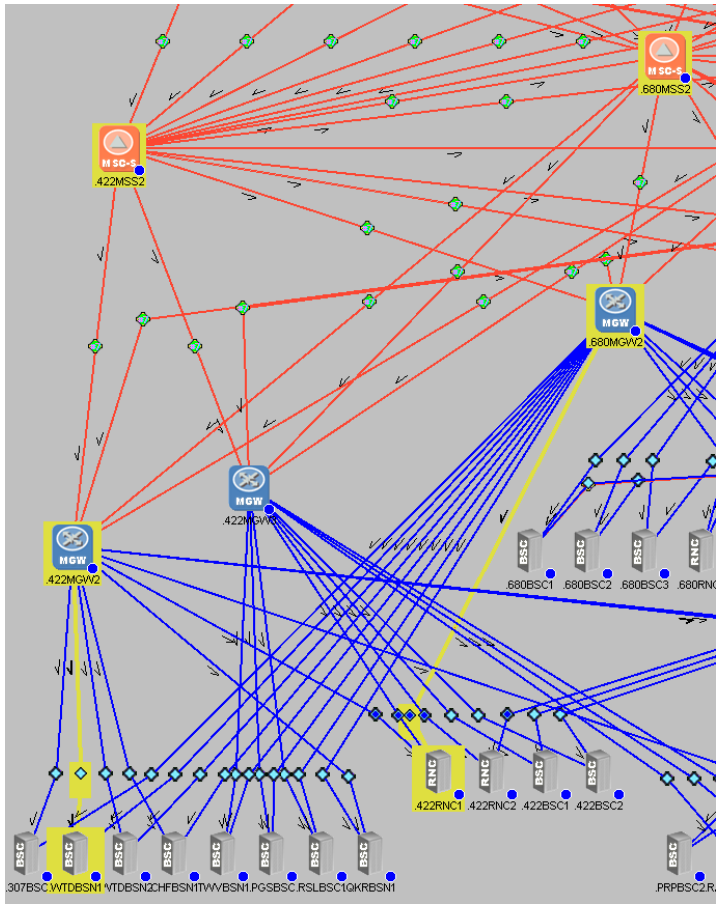
Iu interface extended when Iu over IP

EXPERIENCE SHARING

NETWORK MODEL

Call Control Analysis

	No. of MGWs		
No. of MSCs	***1***	***2***	***Total***
1	58.448%	0.000%	58.448%
2	9.361%	32.184%	41.545%
3	0.001%	0.006%	0.007%
Total	67.810%	32.190%	



Automated analysis + visual tracking

Configuration change recommendations for the inoptimal call cases (e.g. RC, MGG change)

MGW Failure Analysis

With the call simulation feature that takes redundancy, overflows, routing alternatives into account

Result:

The connectivity and configuration provides redundancy for all call case scenarios, although in peak hours certain amount of traffic may be lost due to MGW and/or A interface capacity limitations:

MGW out of service	***Bottleneck***	
	MGW (Erlang capacity may be exceeded in peek hours)	***A interface (transmission capacity may be exceeded in peek hours)***
422MGW2	680MGW2, 706MGW2	CHFBSN1, WTDBSN2
422MGW3	680MGW2, 706MGW3	422BSC2, KKABSN1, KKABSN2, RAHBSC1, TWVBSN1
680MGW2	422MGW3, 706MGW2	CHFBSN1, PGSBSC, TWVBSN1, WTDBSN2
680MGW3	680MGW2, 706MGW3	680BSC2, CBRBSC1, MVWBSC1
…	…	…

EXPERIENCE SHARING

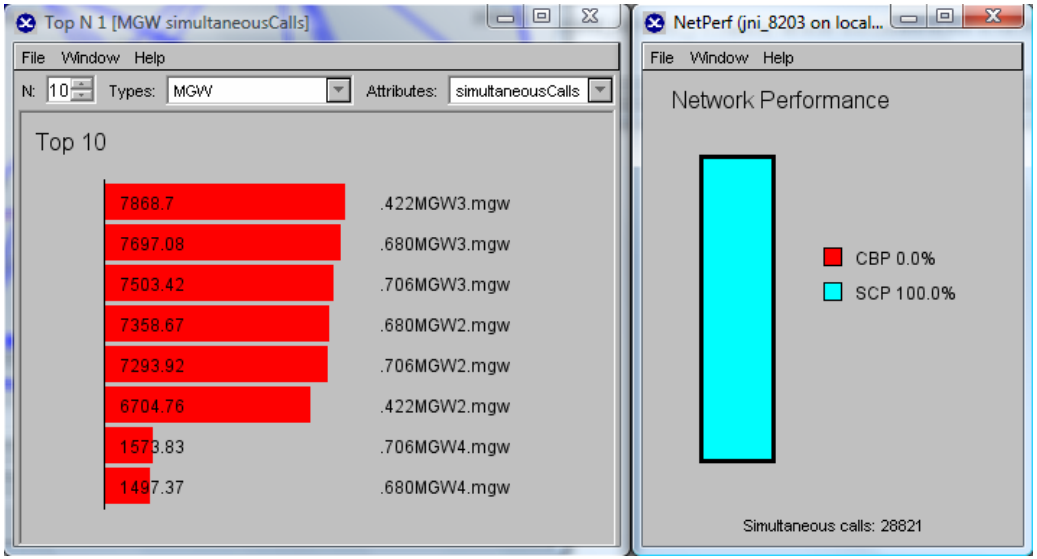
CAPACITY FORECAST

5% Traffic Increase

Current traffic: ~36000 Erl; ~90% (32500 Erl) 2G ~10% (3500 Erl) 3G

Forecast: 5% increase: 37800 Erl; 85% (32130 Erl) 2G 15% (5670 Erl) 3G

The simulation showed that the MSC Servers, Media Gateways, and the A interface transmission capacity is capable of handling the increased traffic.



EXPERIENCE SHARING

CONFIGURATION REVIEW

Major Findings of MSC

The major findings of the MSC/MSC-S are summarized as below:

- MTP Congestion Control parameter setting not aligned with the latest Ericsson recommendation in which the congestion control functionality is improved. (Please refer to 5.2.1 for details)
- SCCP parameter setting not aligned with the latest Ericsson recommendation. (Please refer to 5.2.2 for details)
- SCCP Buffer Setting not aligned with the latest Ericsson recommendation. (Please refer to 5.2.3 for details)
- Congested Trunk Routes will cause certain call failure. (Please refer to 5.2.4 for details)

Nodes	All dev blocked	Included in RC
	GOEXBOI-GOEXBOO	RC=58
	GOEXCOI-GOEXCOO	RC=58
	IN007OI-IN007OO	RC=352
	IN207OI-IN207OO	RC=352
	JPW1BOI-JPW1BOO	RC=493
	JPW1COI-JPW1COO	RC=492
	JPW1VOI-JPW1VOO	RC=494
	JWT5DOI-JWT5DOO	RC=17,477
	JWT5IOI-JWT5IOO	RC=19,479
	LBMD22I-LBMD22O	RC=527
	SKYPE1I-SKYPE1O	RC=516
	SKYPE2I-SKYPE2O	RC=516,517
M13	TSDOI-TSDOO	RC=57
	FMS4BOI-FMS4BOO	RC=148,149
	GOEXBOI-GOEXBOO	RC=58
	GOEXCOI-GOEXCOO	RC=58
	TBET1OI-TBET1OO	RC=21
	TBET2OI-TBET2OO	RC=21
M14	TSDOI-TSDOO	RC=57

Table 18 Congested Trunk Routes causing certain call failure

Recommendation: (for M13 and M14)

Further investigation should be done to confirm the above finding; Corresponding measures should be taken to eliminate the problems if necessary.

MTP Congestion Control Parameter setting

The current MTP Congestion Control parameter and SAE setting for 64K/sec links and 2M/sec HSL links in all related MSC nodes is not following the latest Ericsson guideline, below figure shows the current configuration of the congestion control parameter setting via C7LPP and SAAEP command:

Node Name	Value of SAE 166	64K/sec PARMG 0~7	2M/sec HSL PARMG 16~23		Used PARMG by SL
		CDL1/CDL2/CDL3	CDL1/CDL2/CDL3	Tpoll	
M2	1000	not activated	not activated	100	0,1,16
M4	1000	not activated	not activated	100	0,1,16
M8	400	not activated	not supported	n/a	0,1
M9	370	not activated	not supported	n/a	0,1
M10	1000	not activated	not supported	n/a	0,1
M12	5000	not activated	not supported	n/a	0
M13	5000	not activated	not supported	n/a	0
M14	5000	not activated	not supported	n/a	0

Table 9 Current MTP Congestion Control of MSC

Recommendation: (For all AXE MSC)

It is recommended to align the MTP2 Congestion Control parameter and SAE of all MSC nodes to the latest Ericsson recommendation which as shown in below table.

No.	*Parameter description/name*	*Pseudonym*	*Definition command*	*Value range*	*Default value*	*Recommended Value (LSSL PARMG 0~7)*	*Recommended Value (HSL PARMG 16~23)*
1	MTP Level 2 congestion abatement thresholds	ca *in CDL1, CDL2, CDL3*	C7LPC or AHLPC	0 to 255	255	166,255,255	14,255,255
2	MTP Level 2 congestion onset thresholds	co *in CDL1, CDL2, CDL3*	C7LPC or AHLPC	0 to 255	255	184,255,255	16,255,255
3	MTP Level 2 congestion discard thresholds	cd *in CDL1, CDL2, CDL3*	C7LPC or AHLPC	0 to 255	255	255,255,255	255,255,255
4	MTP Level 2 Tpoll Timer	Tpoll	C7LPC or AHLPC	25 to 775	100	n/a	25
5	MTP Level 3 reconfiguration buffer size	SAE166	SAAII or SAADI	2 to 65535	2	5000	5000

Table 10 Ericsson Recommendation on MTP Congestion Control Parameter setting

Note: The default non-changeable parameters are stored in the parameters group (PARMG) records 0, 16 and 24. The parameters in the parameters group records 1 to 7, 17 to 23 and 25 to 31, can be changed by C7LPC command.

EXPERIENCE SHARING

NETWORK AUDITING

The purpose is to present findings of MSS network node audit, propose corrective actions and recommendations. Main findings are:

- Issues in MSC capacity (SAE, memory)
- Issues in Traffic distribution and characteristics
- Issues in MSC-S and MGW TDM configuration
- Issues in signaling network

- MSC call handling capacity is over 2 times greater than it can be utilized, due to 1:1 limitation.
- There were some SAE in MSC-Server identified that need to be increased to prepare for increased traffic volume levels and abnormal situations.
- Design specifies 8 GW memory in APZ but there is only 4GW in GMSC1. CANDI indicates though that 4MW is enough.

- It was observed that Tandem 1 carries much more traffic; 5 operators are inter-connected to Tandem 1 compared to one operator in Tandem 2.
- Assumed traffic profile does not match the actual characteristics. Because of that, MGw cannot be utilized up to its full licensed capacity.

- A number of mismatches in TDM Group definitions (MGw) and RTDMA (in MSC-Server),
- Devices not in route on MSC side and incorrect labels,
- MTP2bTp allocation per GPB board is not optimal.

- Benefits of fallback or load sharing options between IP to C7 in GMSC1 are not used
- SIGTRAN is not implemented for signalling between GMSC1 and some MSC nodes as per design
- Signaling capacity dimensioning is not available in network design
- Incorrect settings of SCTP parameters. Values are not according to latest guideline and can cause additional problems in the network especially during signaling recovery.

MSS Network

EXPERIENCE SHARING

CAPACITY AND QUALITY MONITORING AND ANALYSIS

Major finding and Recommendation

- **Finding 1:**
  - **Phenomenon:** Most KPIs are good for the whole network. But there are still particular KPIs decrease a little compared with the 1st audit result, and some are not good enough to reach the NetQB world average criteria.

    The KPIs which need further optimization are:

    a) RRC Connection Setup Success Rate

    b) Speech Call Drop Rate

    c) Inter-frequency Handover Failure Rate

    d) Cell/HSDPA/EUL Availability

Recommendation: network optimization should be taken aiming at the above KPIs to further improve network performance.

Major finding and Recommendation

- **Finding2:**
  - **Phenomenon:** No overloading for MP Load and concurrent users. But the Iub throughput of some RNC has exceeded 70%, which means existing risk of Iub congestion.
  - **Recommendation:** Further monitoring Iub throughput, and Iub expansion solution should be considered and planned.

RAN Network

EXPERIENCE SHARING

CAPACITY AND QUALITY MONITORING AND ANALYSIS

RRC Connection Setup Success Rate

Formula used for calculating this KPI:

pmTotNoRrcConnectReqSuccess / (pmTotNoRrcConnectReq - pmnoLoadSharingRrcConr

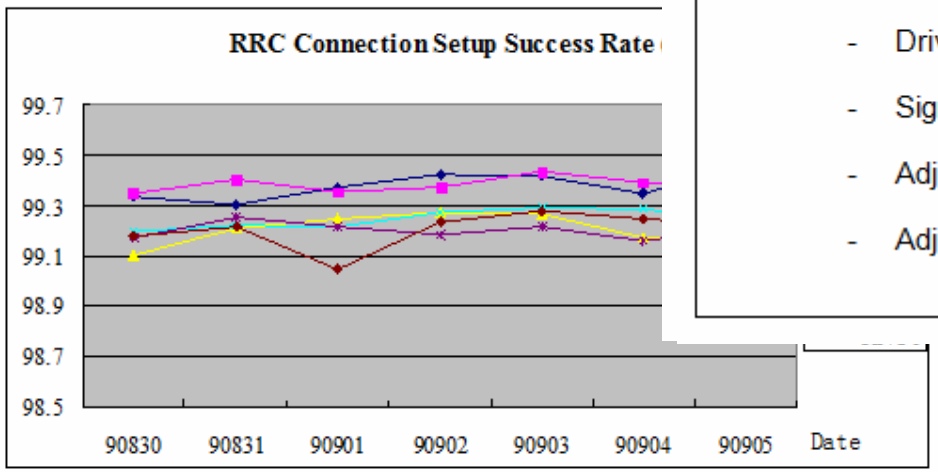


Figure 4-1 RRC Connection Setup Success Rate of 2nd Audit

Note: RNC06 performance disturbance on 1st of Sept was caused by the "CE hanging" problem in cell

Recommendations:

Daily and onsite network optimization working is also a preferred method to further analyze and solve the problem. Bellow actions should be taken to find which one of the above is the root cause of RRC failure for particularly critical cells:

- Drive Test and Post Analysis
- Signal Tracing from RNC
- Adjust relative parameters
- Adjust site and antenna configurations

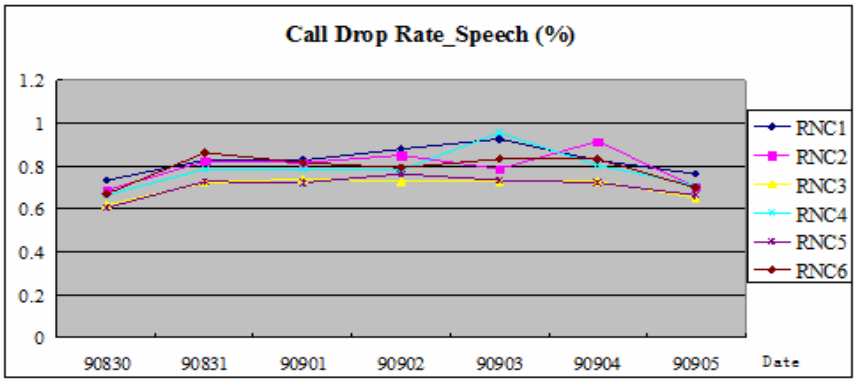
EXPERIENCE SHARING

CAPACITY AND QUALITY MONITORING AND ANALYSIS

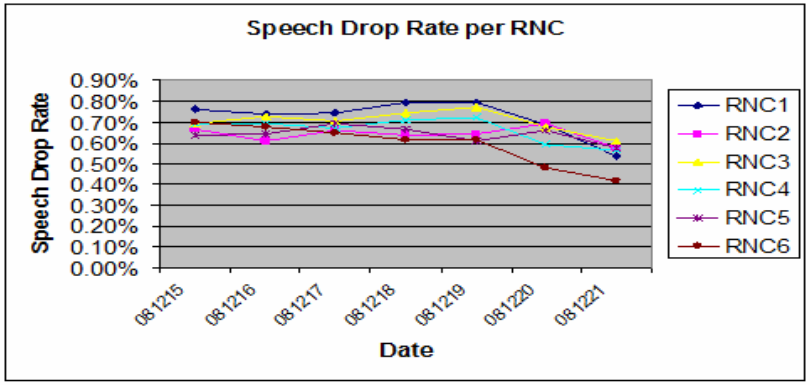
Speech Drop Rate

Formula used for calculating this KPI:

pmNoSystemRabReleaseSpeech / (pmNoNormalRabReleaseSpeech + pmNoSystemRabReleaseSpeech)



Speech Call Drop Rate of 2nd Audit



Speech Call Drop Rate of 1st Audit

- ANALYSIS

Possible Causes of Dropped Calls

Main Causes
LOW Ec/Io,BLER 100%,LOW RSSI --> LOW COVERAGE?
LOW Ec/Io,BLER 100%,HIGH RSSI --> MISSING NEIGHBOUR?
LOW Ec/Io,BLER 100%,HIGH RSSI AND SCANNER REVEALS MANY SC WITH CLOSE SIGNAL LEVEL - _ > PILOT POLLUTION?
NO RESPONSE TO MR IN BAD RADIO CONDITION
RRC CONNECTION RELEASE UNSPECIFIED
DISCONNECT NW –> UE:CAUSE UNSPECIFIED
NO RESPONSE TO MR IN GOOD RADIO CONDITION

RAN Network