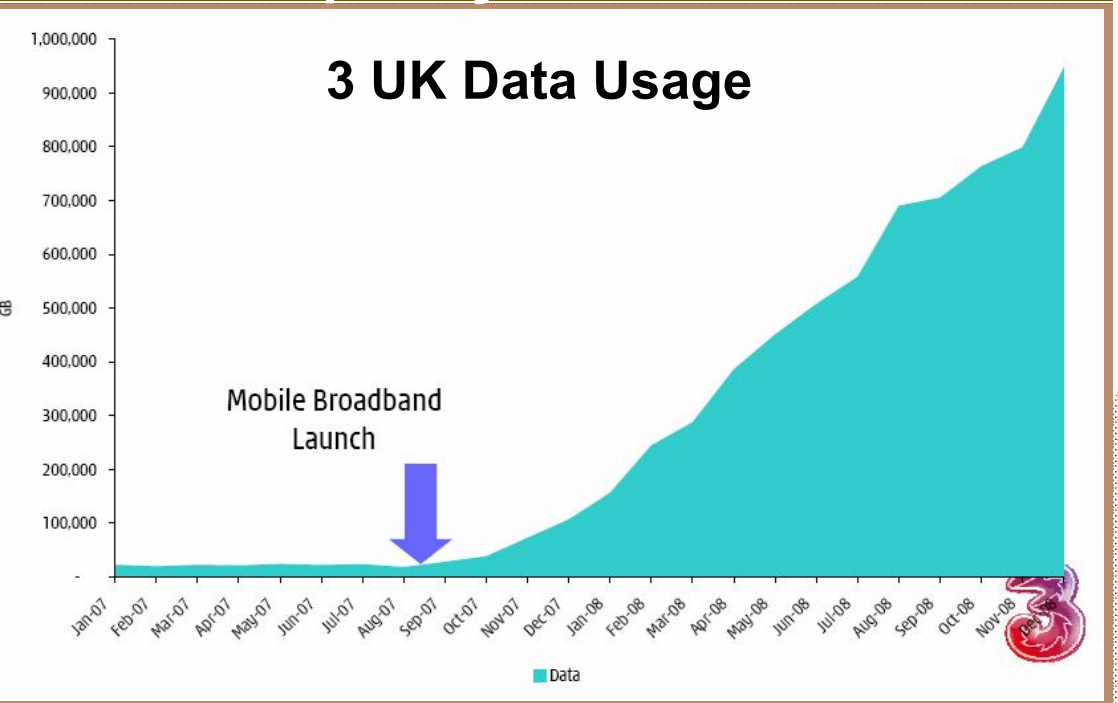
Вопрос емкости или стоимости - LTE решает обе задачи

Игорь Кокоцкий Ст. консультатнт по поддержке продаж в России и СНГ
Motorola Home & Networks Mobility

Тенденции

Данные оператора HSPA по передаче данных Линейный рост уже 2ой год!



Source: “HSPA + … on the road to LTE”, Dr. Erol Hepsaydir, 3 UK, 20th April 2009

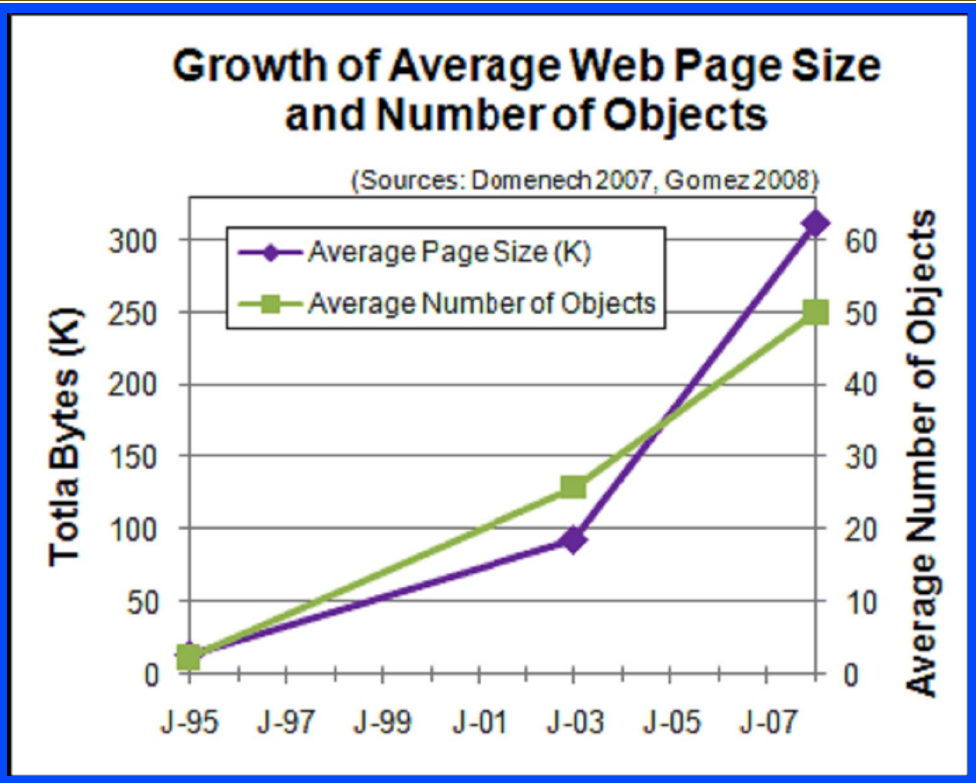
Экономика увеличения емкости 3G не соответсвует возможностям роста прибыли

- Стоимость апгрейда 3G сети растёт быстр
  - *Потребность в новых частотах*
  - *Расщепление cot*
- Результат для бизнеса: Прибыли ниже
  - *Стоимость растёт быстрее прибыли*

Просто необходимо:

Снижение стоимости за 1 бит

Размер / сложность веб сайта растёт



Source: WebsiteOptimization.com, April, 2008.

Выше размер веб страницы
= требует *расширение полосы*

Большее к-во обьектов страницы
= требует *снижения задержек*

Ассиметрия роста трафика

- ***~200,000 Youtube Uploads / day*** [1]
- ***~200,000,000 Youtube DL streams / day*** [2]

[1] Dr. Michael Wesch, Kansas State University
[2] Calculated from comScore, March 4, 2009

Потоковое видео

Использование беспроводного Интернета отстает от проводного на 3-5 лет

75% пользователей смотрят видео онлайн*
YouTube = 27% of internet traffic
~200M streams per day

Видео стриминг толкает фиксированых пользователй на превышение их т.н. лимитов Fair Usage Policy (30-50GB/m)
10% UK Fixed Line BB Subs go over FUP in October 08

Не только ноутбуки… короткие клипы идеальны для телефонов 15min of daily YT = 1.2GB/month

Пользователи в 2011

Road Warrior
Laptop + Mobile

APPS	Days / Mo	KB / Day	Hrs /day	Kbps	KB / Mo
VoIP/Conference on Mobile	20		1	64	576,000
VoIP on Mobile				65	87,750
Netmeeting wh				500	450,000
Outlook (100 er					220,000
Outlook (100 er only 5 attachme					480,000
Communicator				3	43,200
Linked-In, profile down				128	115,200
Competitor sites, News sites, etc… (Bursty traffic)	4		1	100	180,000
Home recorded movie on hard drive set top box / Sling / Com				1000	1,800,000
Youtube, N					576,000
Radio strea					576,000
				h	5.1

Video 2.4GB/month

5.1 GB/month

Urban Professional
Laptop + Mobile

APPS	Days / Mo	KB / Day	Hrs /day	Kbps	KB / Mo
VoIP on Mobile				64	86,400
Outlook (20 ema					44,000
Outlook (20 ema					330,000
Live Messenger				3	405,000
MySpace/Facebo up and down				128	144,000
General Browsing, Music + News sites, etc…	10		0.5	100	225,000
Home recorded movie on hard drive set top box / Sling / Com				1000	3,600,000
Youtube, N					345,600
Radio strea					864,000
				h	6.0

Video 3.9GB/month

6 GB/month

College Student
Laptop + Mobile

APPS	Days / Mo	KB / Day	Hrs /day	Kbps	KB / Mo
VoIP on Mobil				64	172,800
Outlook (10 er					315,000
Outlook (10 er					315,000
Live Messeng				3	405,000
MySpace/Face up and down				128	172,800
General Browsing, Music + News sites, etc…	20		1.0	100	900,000
Home recorded movie on hard drive set top box / Sling / Co				000	5,400,000
Youtube,				56	1,152,000
Radio str				28	2,304,000
				h	11.1

Video 4.5GB/month

11.1 GB/month

Typical
Mobile only

APPS	Days / Mo	KB / Day	Hrs /day	Kbps	KB / Mo
VoIP on Mobile				64	432,000
Outlook (5 emails					125,000
General Browsing, Price check + News sites, etc…	20		1.0	100	900,000
Youtube, N				56	1,152,000
Radio strea				28	115,200
				h	2.7

Video 1.2GB/month

2.7 GB/month

Экономия OPEX и CAPEX

Покрытие

- No “cell breathing” issue – can cost CDMA networks 35% of coverage area

Пропускная способн. сект

- Spectral efficiency
  Approx. 3x-4x HSPA
- Less overhead
  than multi-carrier HSPA

Самоорганизущиаяся сеть

- Fewer new resources required to expand the network
- Less downtime with faster, more automated processes

Экологичность

- Greater power efficiency
- Deployment Options
- Green power sources
- Greater capacity per site

Открытость, гибкость

- Open interfaces for interoperability, driving competition and lower costs
- Less boxes in architecture
- Geographic distribution / server pooling

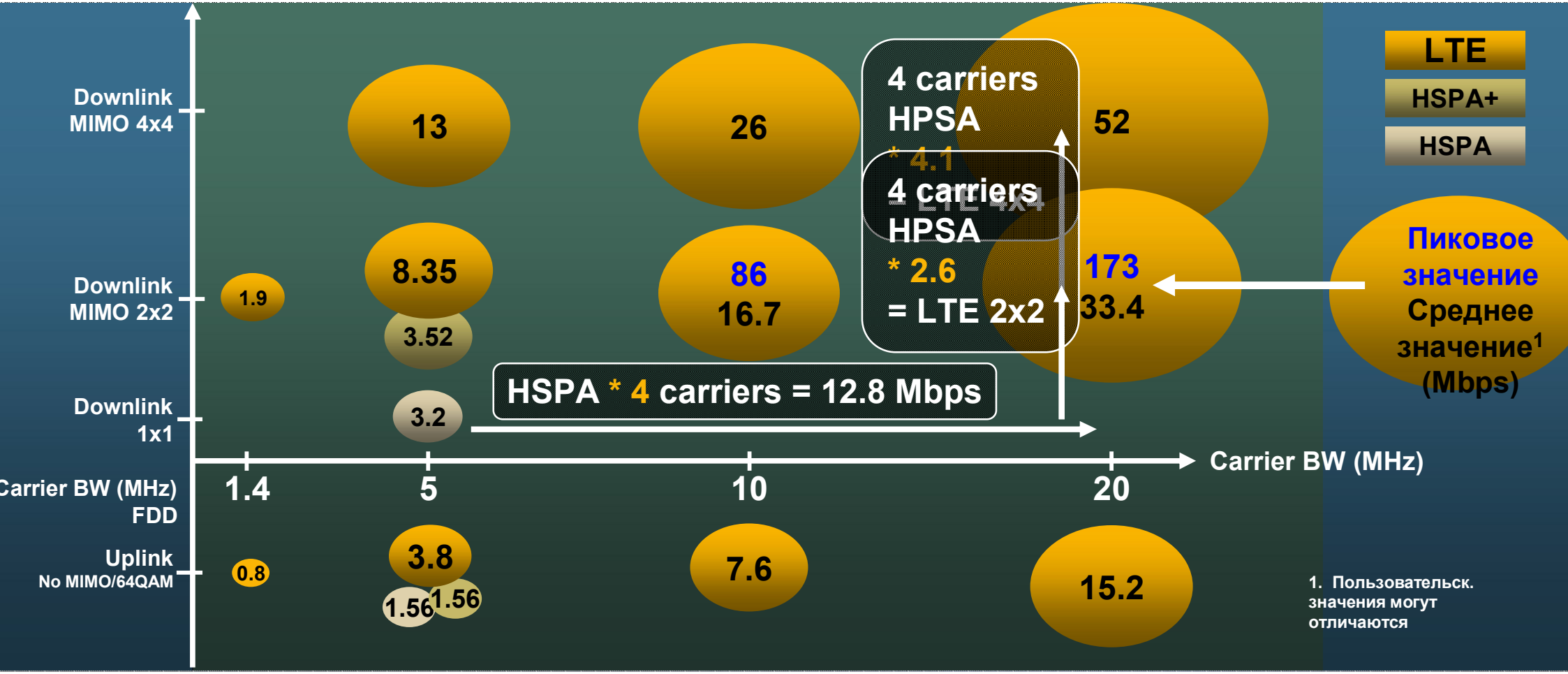
Транспорт

- Fewer Large LTE Backhaul links vs. More Small Backhaul links for cell splitting

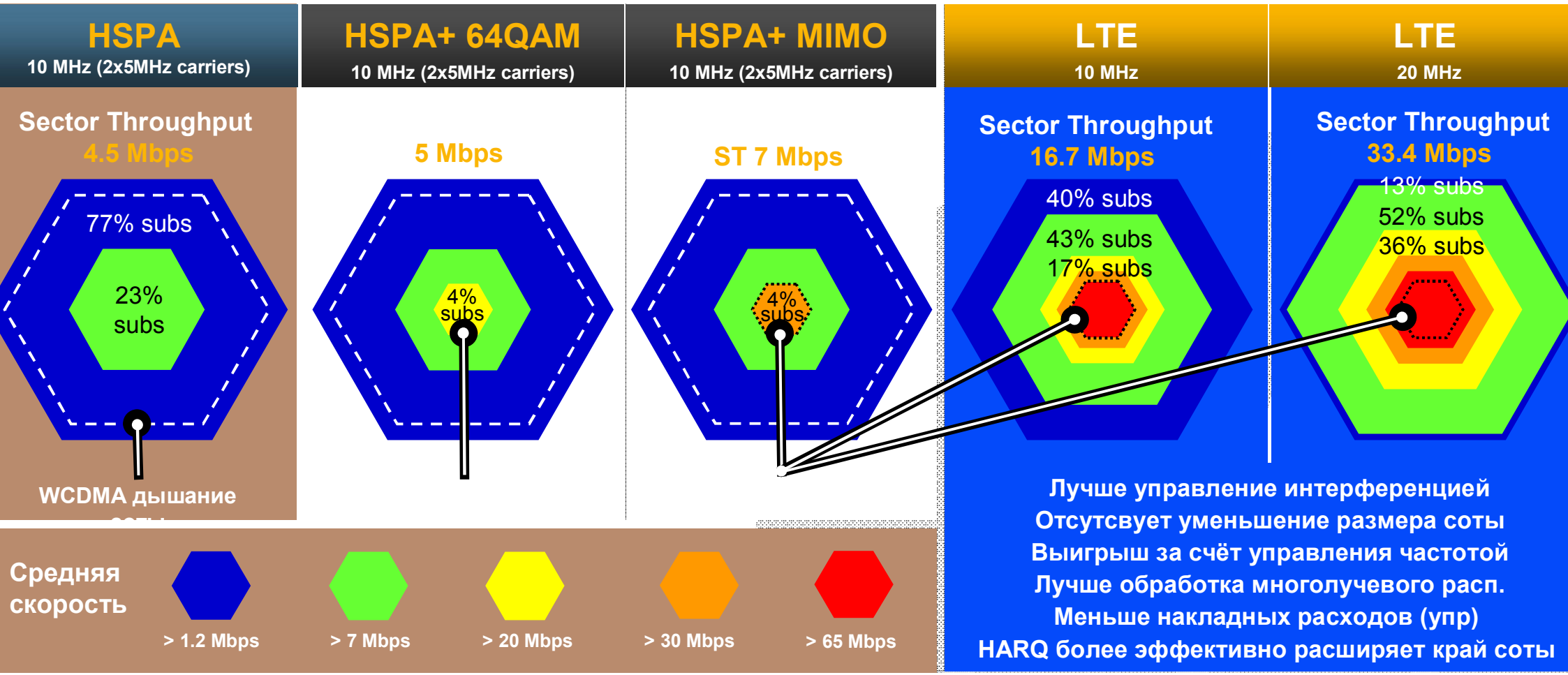
Большая емкость снижает ОСВ (TCO)

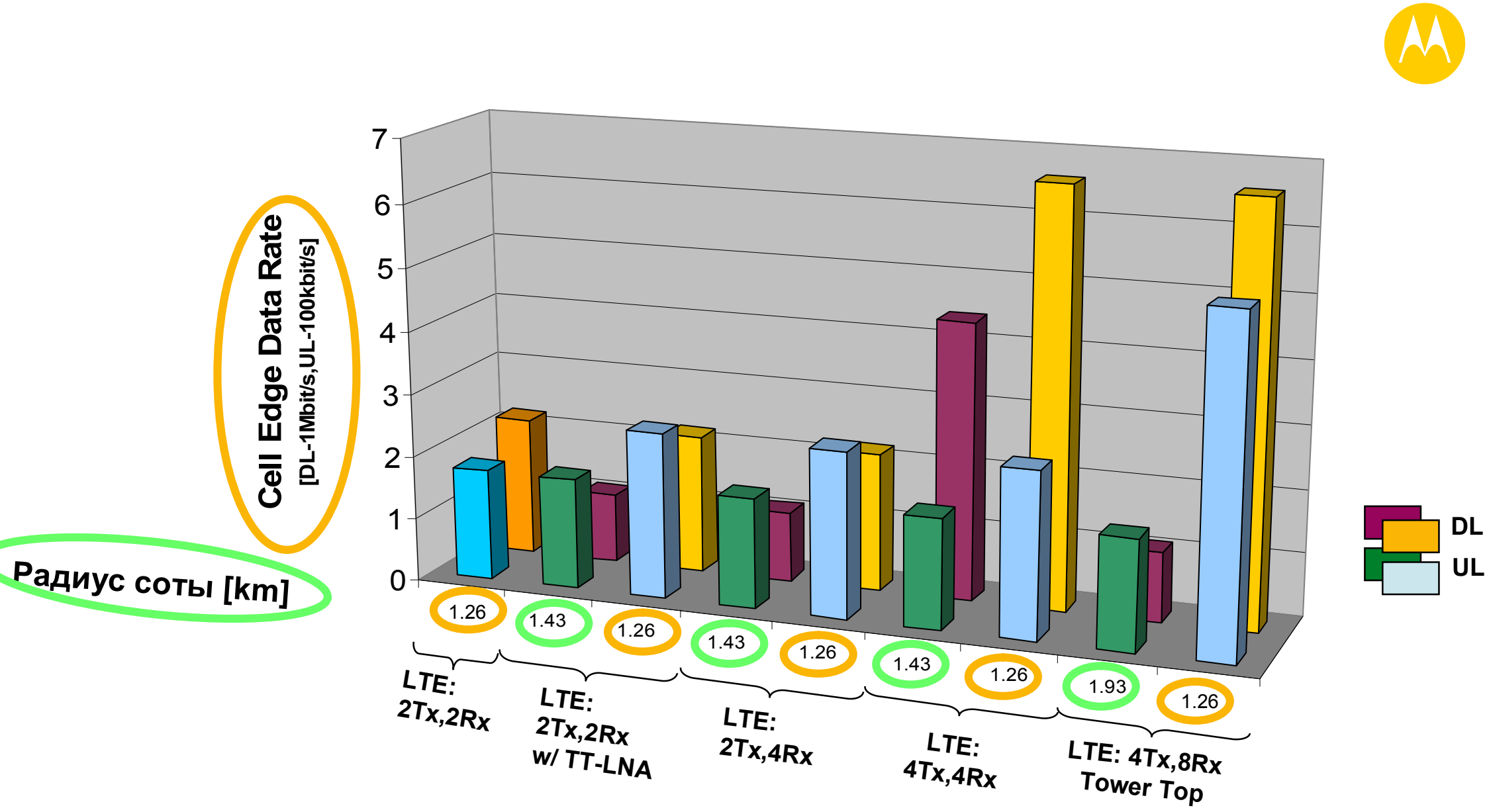
Архитектура LTE и инновации несут ещё больше экономии ОСВ (TCO)

Емкость LTE

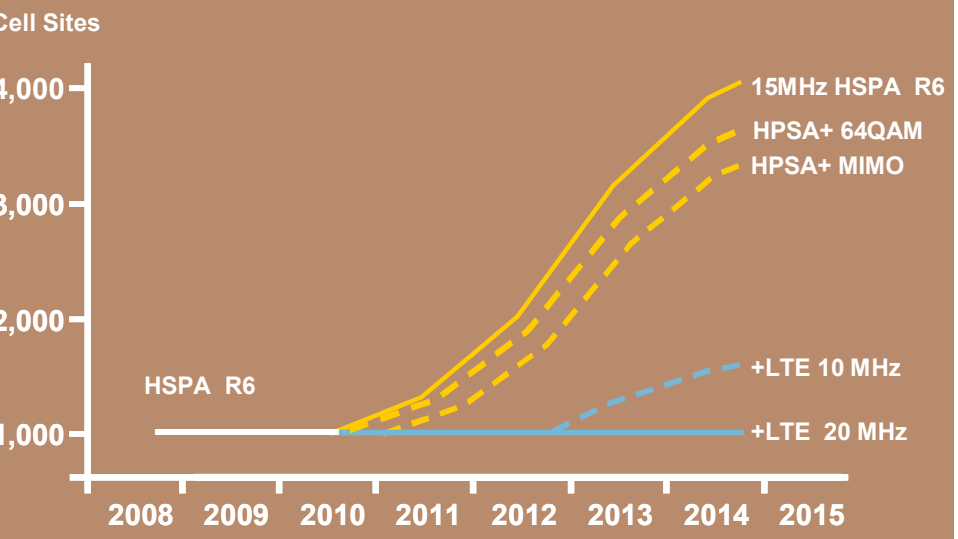

Downlink MIMO 4x4
Downlink MIMO 2x2
Downlink 1x1
Carrier BW (MHz) FDD
Uplink No MIMO/64QAM
13
26
4 carriers HPSA
* 4.1
= LTE 4x4
52
8.35
86
16.7
4 carriers HPSA
* 2.6
= LTE 2x2
173
33.4
1.9
3.52
3.2
HSPA * 4 carriers = 12.8 Mbps
1.4
5
10
20
Carrier BW (MHz)
3.8
7.6
15.2
0.8
1.56
1.56
LTE
HSPA+
HSPA
Пиковое значение
Среднее значение[1] (Mbps)
1. Пользовательск. значения могут отличаются


LTE
HSPA+
HSPA
Downlink 4x4
Downlink 2x2
Downlink 1x1
Uplink No MIMO/64QAM
Carrier BW (MHz) FDD
Carrier BW (MHz)
1.25
5
10
20
54
108
217
34
69
139
14
13
7
3
15
6
6
31
63
2.5x users
10x Improvement
Пользо


HSPA
10 MHz (2x5MHz carriers)
HSPA+ 64QAM
10 MHz (2x5MHz carriers)
HSPA+ MIMO
10 MHz (2x5MHz carriers)
LTE
10 MHz
LTE
20 MHz
Sector Throughput
4.5 Mbps
77% subs
23% subs
WCDMA дышание
5 Mbps
4% subs
ST 7 Mbps
4% subs
Sector Throughput
16.7 Mbps
40% subs
43% subs
17% subs
Sector Throughput
33.4 Mbps
13% subs
52% subs
36% subs
Средняя скорость
> 1.2 Mbps
> 7 Mbps
> 20 Mbps
> 30 Mbps
> 65 Mbps
Лучше управление интерференцией
Отсутсвует уменьшение размера соты
Выигрыш за счёт управления частотой
Лучше обработка многолучевого расп.
Меньше накладных расходов (упр)
HARQ более эффективно расширяет край соты


Cell Edge Data Rate
[DL-1Mbit/s,UL-100kbit/s]
Радиус соты [km]
7
6
5
4
3
2
1
0
1.26
1.43
1.26
1.43
1.26
1.43
1.26
1.93
1.26
LTE: 2Tx,2Rx
LTE: 2Tx,2Rx w/ TT-LNA
LTE: 2Tx,4Rx
LTE: 4Tx,4Rx
LTE: 4Tx,8Rx Tower Top
DL
UL

Модель сайтов для 3GB/месяц в 2011



Изначально: HSPA 15MHz

2012: 2.5 x Cell sites

- Time to market
- CAPEX – New node-B/ancillaries
- OPEX – New sites
  Utilities, Maintenance impact, duplic
  backhaul links, …

Upgrade to HSPA+ 64QAM

2012: 2.3 x Cell sites

+10% sector throughput
+Software upgrade (latest node-B)
- Better Perf. Only for 2-5% subs
- Require new devices

HSPA+ 15MHz add MIMO

2012: 2.1 x Cell sites

+ 60% sector throughput
- Does not cut cell site splitting
- Time to market = LTE
- Hardware upgrade (MIMO)
- Require new devices

Добавь LTE 10 MHz / 20MH

10MHz: Limit # of new sites
20MHz: No new sites required

+250% sector throughput
+Lower OPEX (SON/QoS/..)
+Fixed line BB like service
- Hardware upgrade
- Require new devices

Для тех же CAPEX инвестиций, LTE минимизирует к-во сот, понижает OPEX и дает лучший сервис для пользователей

Емкость сети продемонстрирована

Испытания для глоб. заказчиков

Пре-коммерческое решение на MWC и CTIA

- 2 x eNodeB with 1 Sector each
- PTP backhaul link to core for staging site
- EPC core network
- Video core – encoding / media server / IPTV

Реалистичные условия

- Demonstrated 2 handovers
- 2.6 GHz and 700 MHz spectrum
- LTE RAN standard compliant (December standard at MWC)
- 10MHz channel bandwidth
- Challenging RF conditions

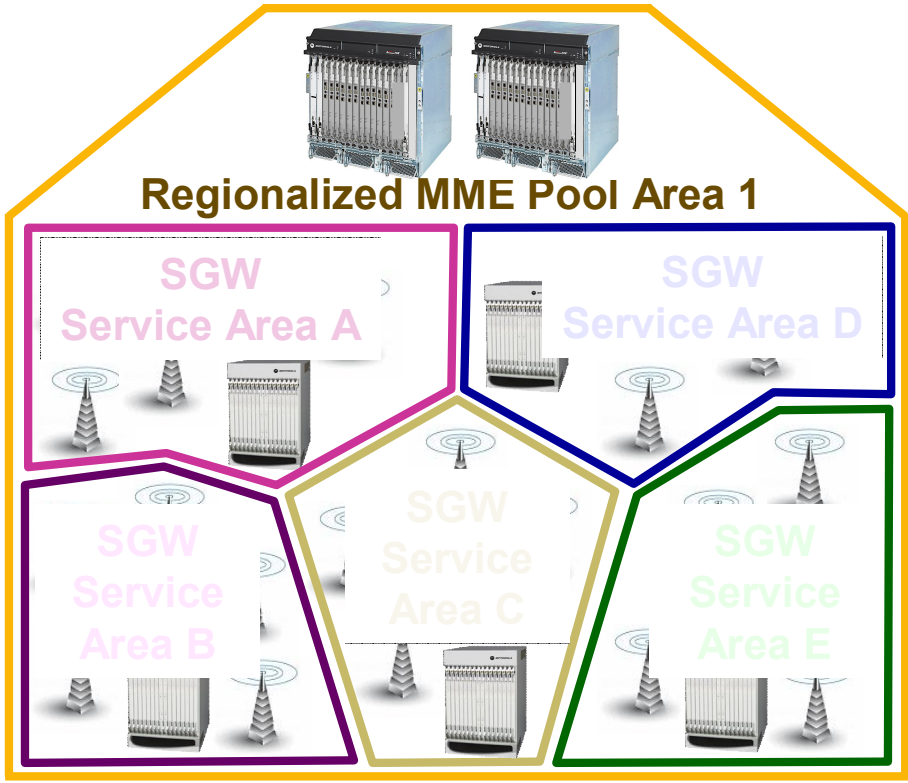
Выставки MWC and CTIA демо драйв

Доп. факторы снижения TCO

Вариант с распределённым ядром

Стабильный, Гибкий, Экономный

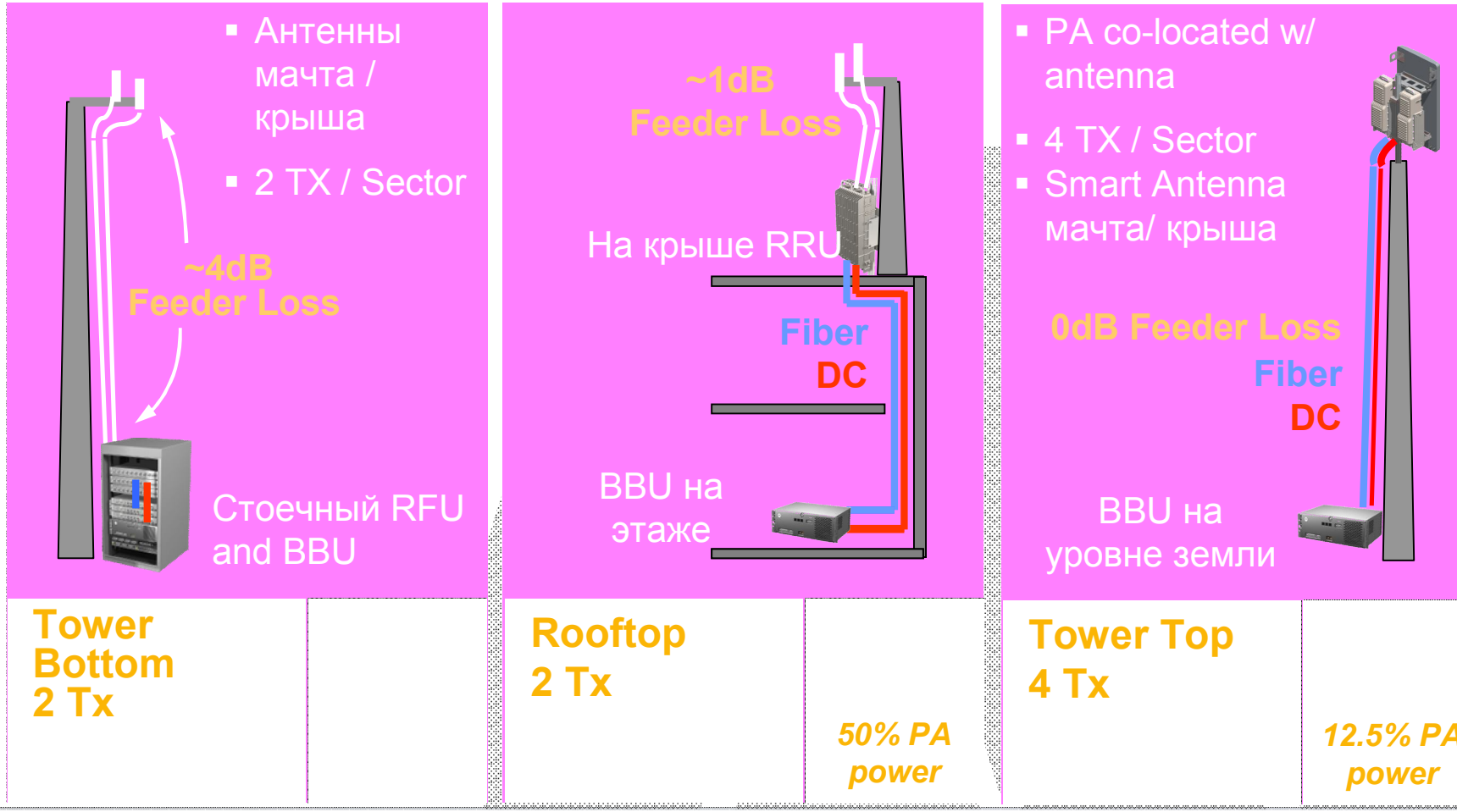
- **Segregation of Control (MME) and Dataplane (SGW)**
  - *Optimized Platforms for Specific Function*
  - *Scalability*
- **Geographic Distribution**
  - *Optimize for Backhaul Cost/Latency Efficiency*
  - *Improved MME resource sharing across a large area*
  - *Network Reliability*
- ***EPC Deployment/Operational Cost Advantages***



“Экологичность”

Выше Эффективность

Power Amplifier Configurations



Tower Bottom 2 Tx

Rooftop 2 Tx

50% PA power

Tower Top 4 Tx

12.5% PA power

“Экологичность”

Выше Эффективность

Baseband

Processing Power

Supporting:

- Multi-technology platform
- Smaller frame sizes
- Greater data processing
- Sophisticated Rx/Tx Algorithms
- Lower power consumption

BCU I

- 20 RU
- LTE Pre-Commercial Up to 10 MHz FDD/TDD

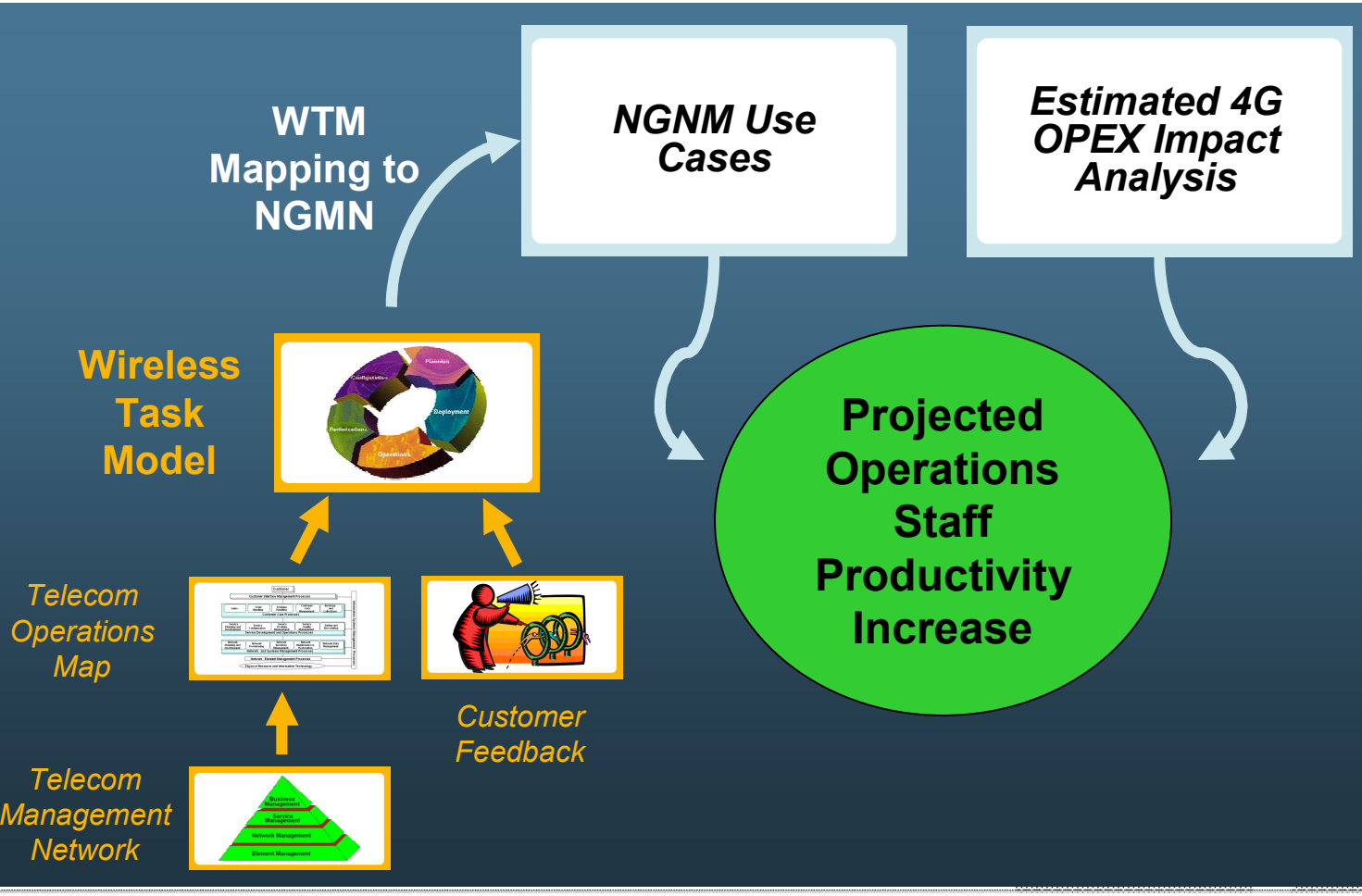
BCU II

- 3 RU
- LTE Commercial Up to 20MHz FDD/TDD

BCU III

- 1 RU
- Fan-less operation
- Multi-carrier
- Up to 20 MHz
- More Complex Antenna Support
- FDD/TDD
- 60%+ lower power consumption

2006 2008 2010



Key Factors In Productivity Change:

- Automation
  - Elimination of tasks
  - Operational efficiencies
  - Increased value of existing staff
- Less expertise required
- Less high-level oversight

Motorola SON Awards

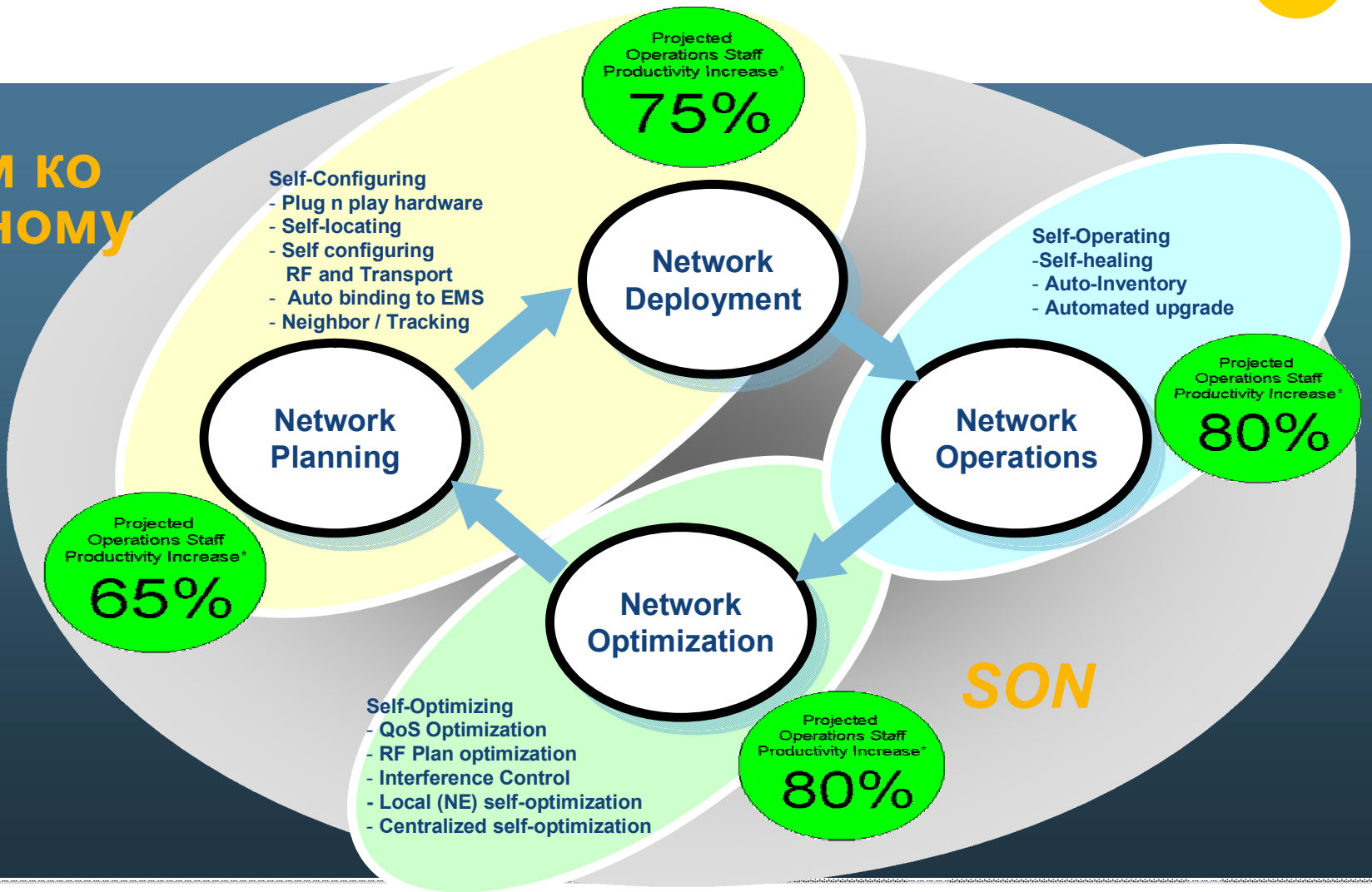
CTIA 2009 Emerging Technology Awards
3rd Place
April 8, 2009

LEADERSHIP TMC NGN Next Generation Networks 2009 AWARD
April 22, 2009

SON применим ко всему жизненному циклу сети

SON is driven by NGMN which sets direction for 3GPP.

The vendors implementation is verified in LSTI.



Когда SON не существовало

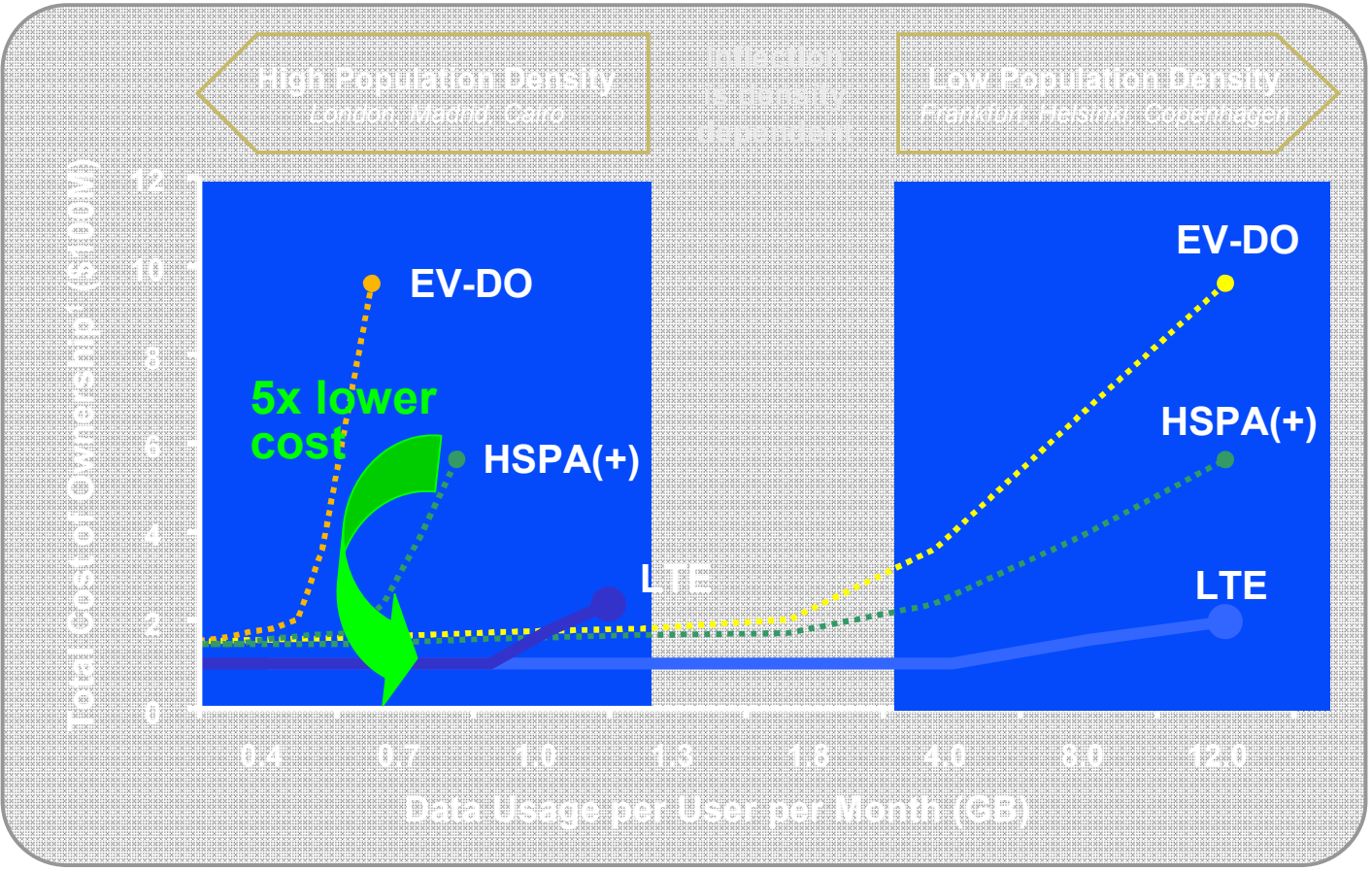
1. RF Planning tool populated
2. Neighbors and PCIs created by Planning Tool
3. Planner selects subset appropriate for export to EMS
4. EMS imports neighbors and PCIs
5. Operator merges planning tool import with workspace configuration
6. Operator commits workspace configuration
7. Operator initializes sites with new configuration
8. Cells enter service
9. Optimizer corrects neighbors and PCIs for planning tool inaccuracy

Решение SON Motorola

1. Operator initializes site
2. Cells automatically
   a) acquire temporary PCI values and enter service
   b) determine neighbor list
   c) derive and switch to geographically unique permanent PCI value

Использование Motorola ANR + PC

Влияние на сервисы



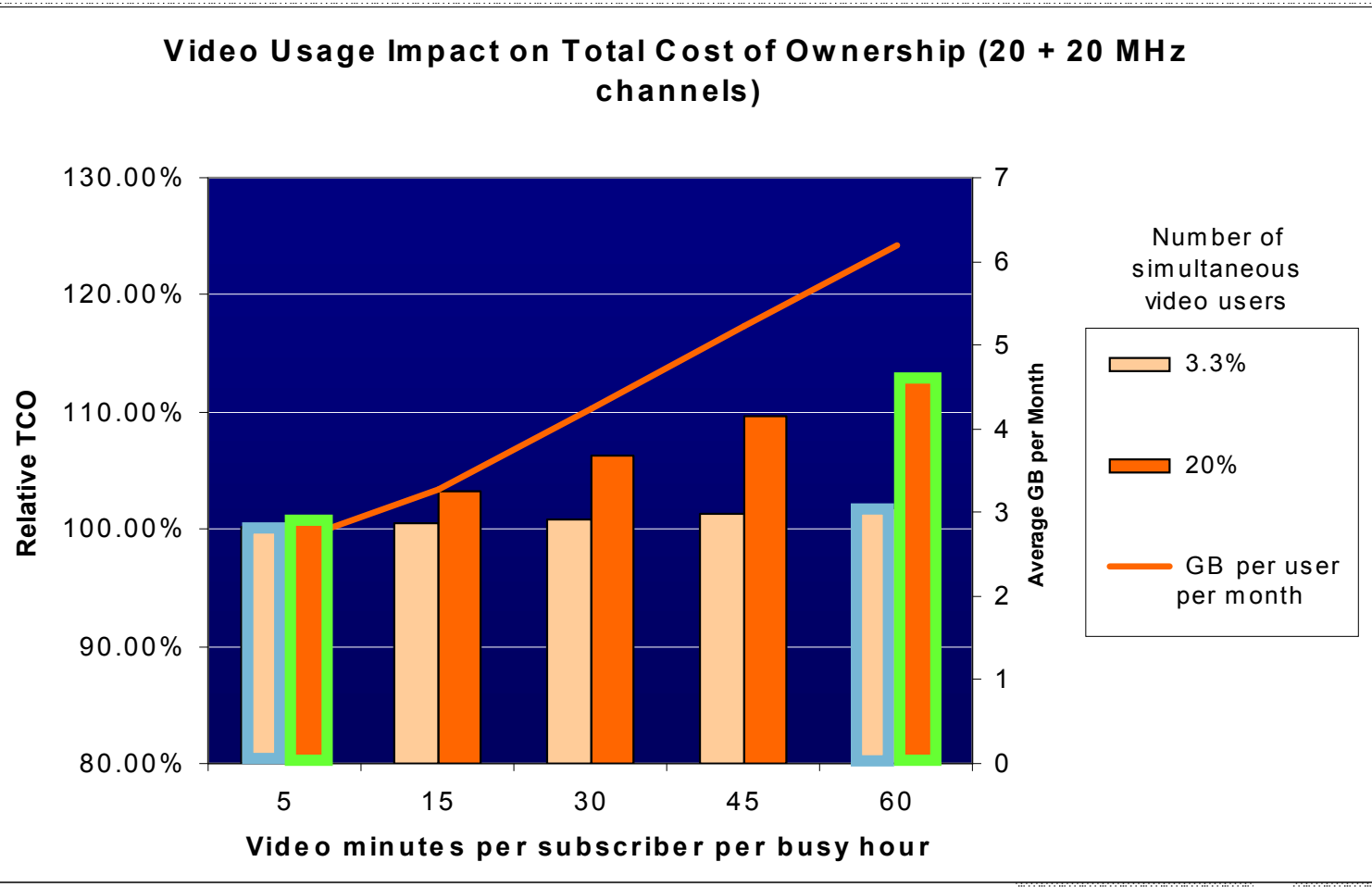
Cost per MB (US $)

LTE [1]	
HSPA [2]	
1xEV-DOr0 [2]	
EDGE [2]	

Impact on Video Delivery
(at system maturity)

- **90 Minute Movie on LTE costs $1.01** (HVGA, 10+10 MHz)
- **90 Minute Movie on HSPA costs $5.06** (HVGA, 2x 5+5 MHz channels)

NOTE: Costs are dependent on user density, and estimates for different technologies are dependent on the model parameters used



If Video usage increases from 5 to 60 minutes in a given hour, with…

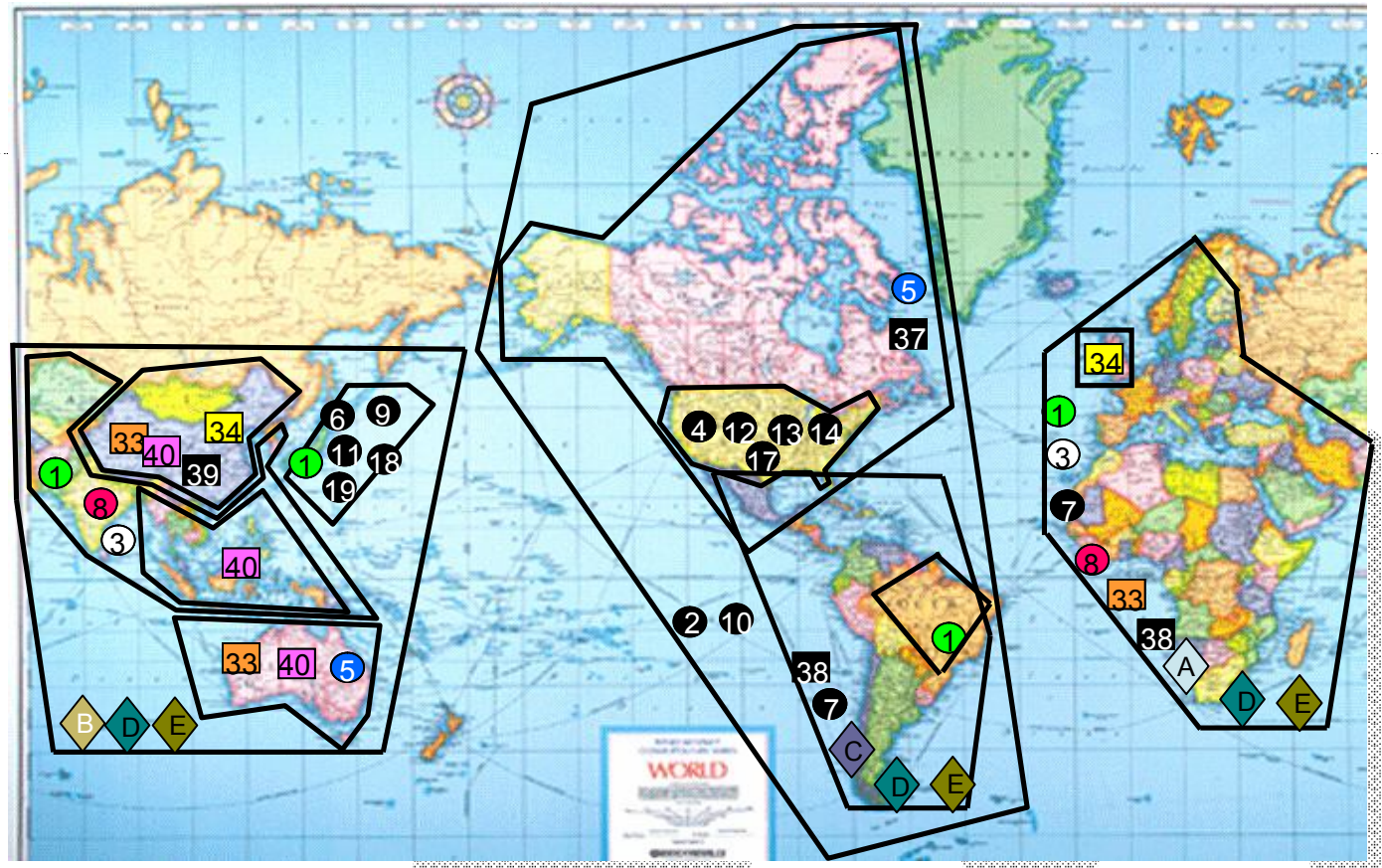
2) **3.3% of users** simultaneously using video (130% avg. per-user traffic increase)
=> 1% TCO increase

1) **20% of users** simultaneously using video (260% avg. per-user traffic increase)
=> 12% TCO increase

LTE provides Capacity for Video uptake & Scales with limited TCO impact

Вывод

early LTE



7 - (2500~2570)/(2620~2690)
8 - (880~915)/(925~960)

)

12 - (698~716)/(728~746)

14 - (788~798)/(758~768)

A - EMEA DD (791~821)/(832~862)

38 - (2570~2620)/(2570~2620)

40 - (2300~2400)/(2300~2400)

Black – Band available in a single region
Color – Band available in multiple regions
Circle / Square – FDD / TDD
Diamond – Others (no 3GPP Band Number yet)

Емкости Стоимости

Стимость и емкость

- Sector Throughput
- Coverage
- Open, Flexible Architecture
- Power Efficiency (Green)
- Autonomics: Self-Organizing Networks (SON)

Необходимо учесть

- Spectrum
- Backhaul
- Devices

Mobile Broadband

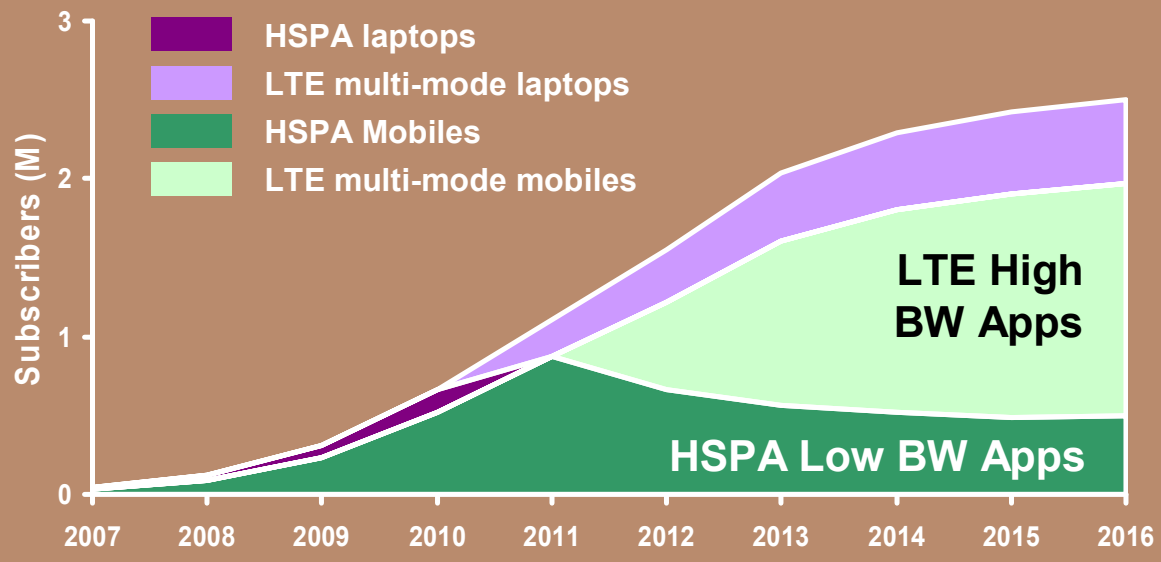
- Use LTE + HSPA to meet total demand

Move Laptops & Netbooks to LTE

- Highest GB/month consumption
- Ease congestion in HSPA for mobiles
- Devices where performance is most noticeable
- First devices with LTE capabilities via USB dongles

LTE / HSPA Mobiles in 2011+

- Growing demand as smart phones dominate



Note: HSPA Only devices served by HSPA.
LTE/HSPA multi-mode devices served by HSPA and LTE

HPSA & LTE - Leverage LTE to off-load heavy traffic from HSPA

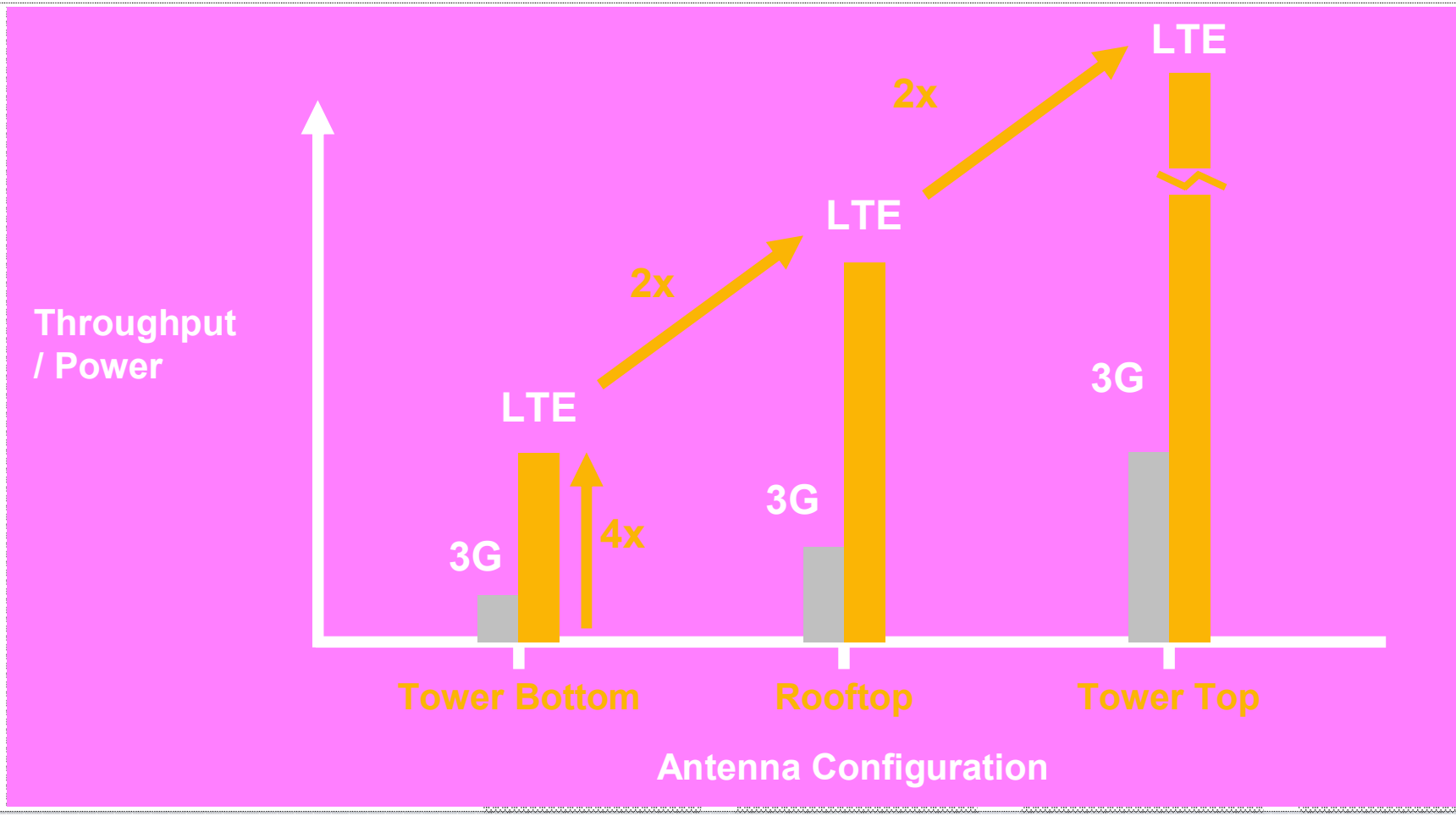
Early LTE deployments helps lower operators TCO

Дополнительно

“Green”

Greater Efficiency

Wider Carriers and Spectral Efficiency adds to Site Efficiency



MIMO & 64QAM Limitations

Need 10 dB C/I environment

=> Only 2-5% of cell sub benefit

+ Affected by Urban Canyon

LTE Air Interface Improvements

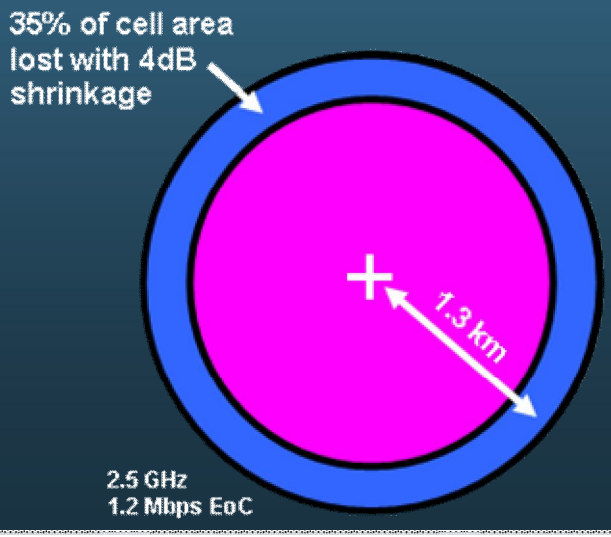
LTE standard focused on more uniform cell performance

- No intra-cell interference
- Better interference cancellation
- Uniquely assigned sub-carriers
- Better multi-path signal handling
- Lower control overhead
- Frequency selective scheduling
- Higher bandwidth = lower overhead
- 7 different multiple antenna schemes
- More efficient Multicast-Broadcast

CDMA Cell Shrinkage

↗ WCDMA subs ↗ intra-cell noise ↘ SNR ↘ data rate ↘ capacity

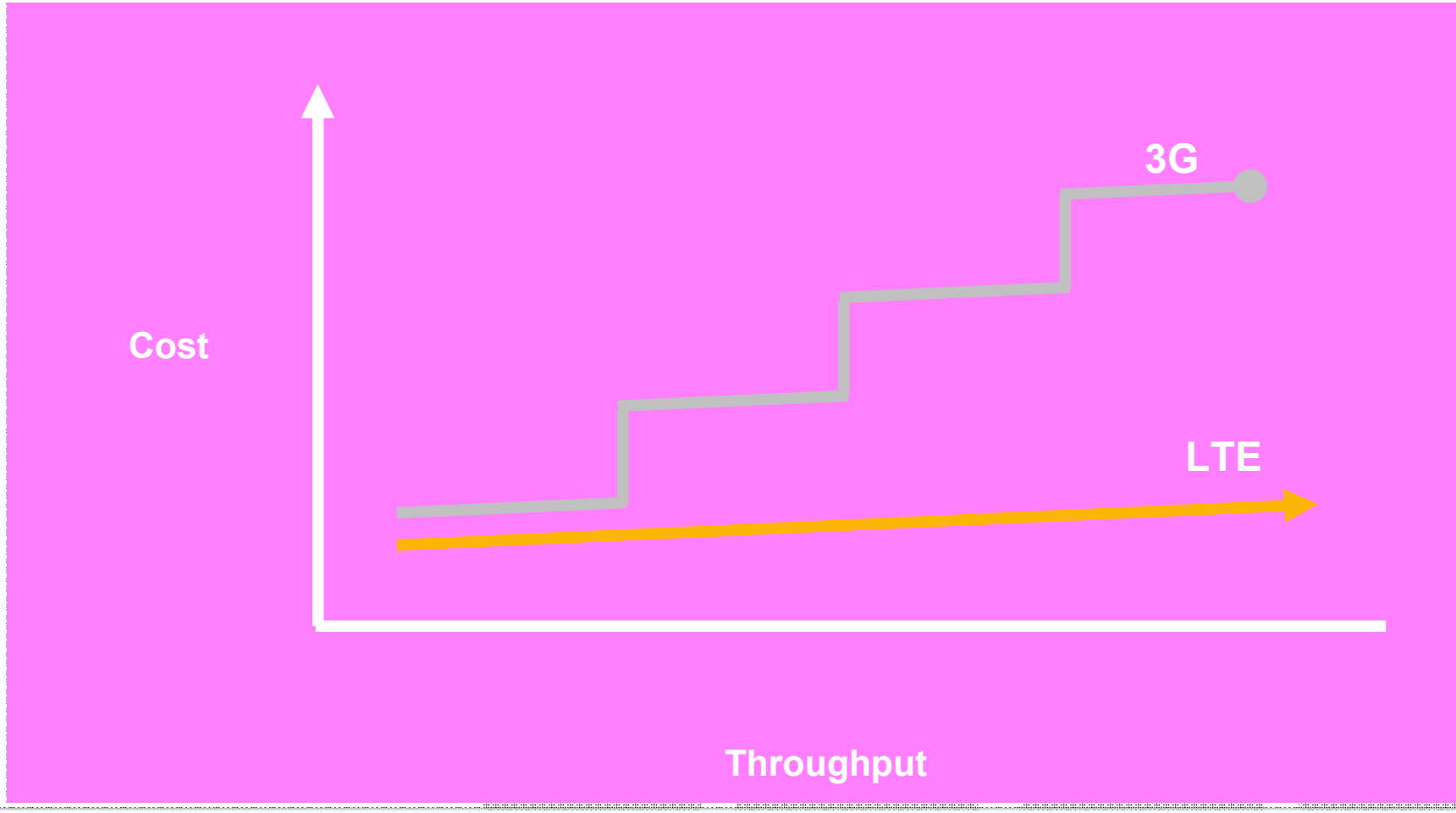
OFDM not susceptible; sub-carriers not instantaneously shared



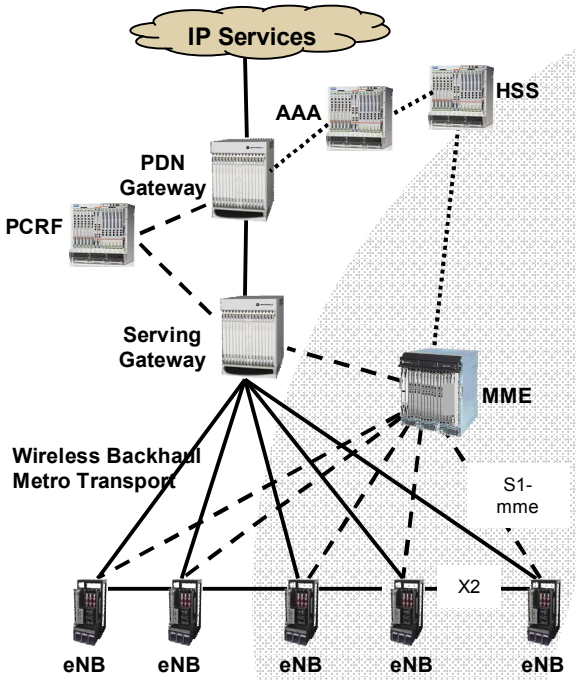
“Green”

Greater Efficiency

Spectral Efficiency adds to Site Configuration



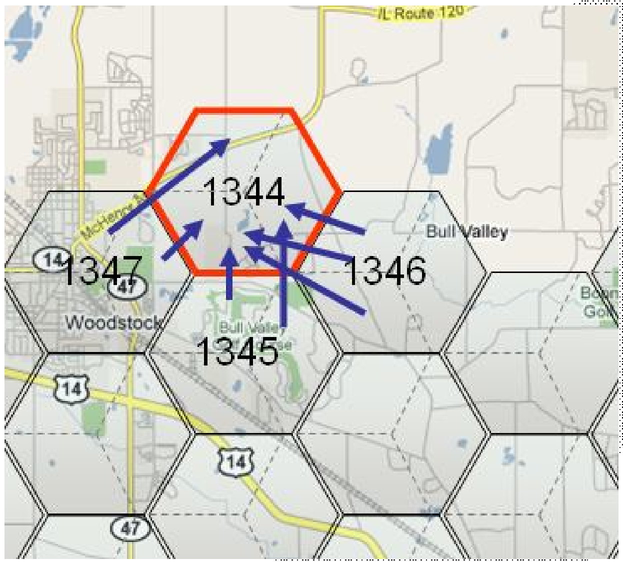
SON Value Use Case: Transport



Motorola SON Improvement

SON Value Use Case: ANR & PCI

Motorola SON Improvement



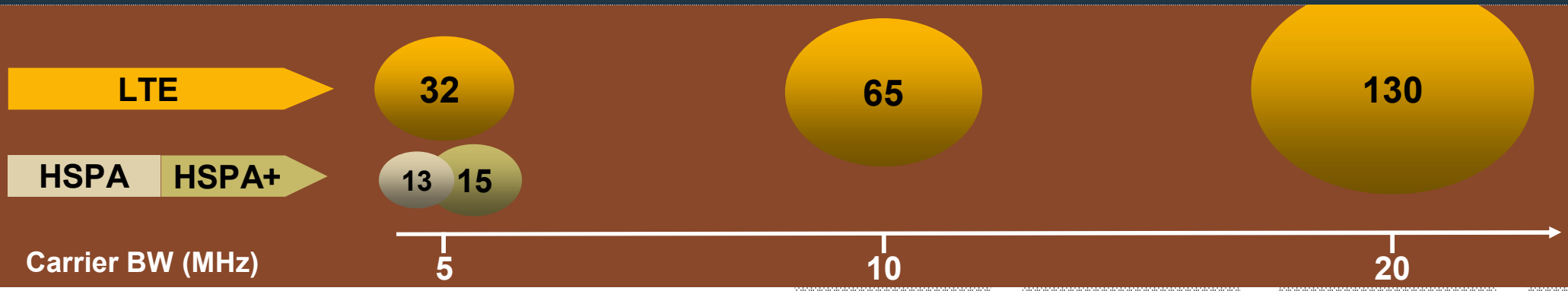
Motorola SON Automat… Neighbor Relationships Improvements

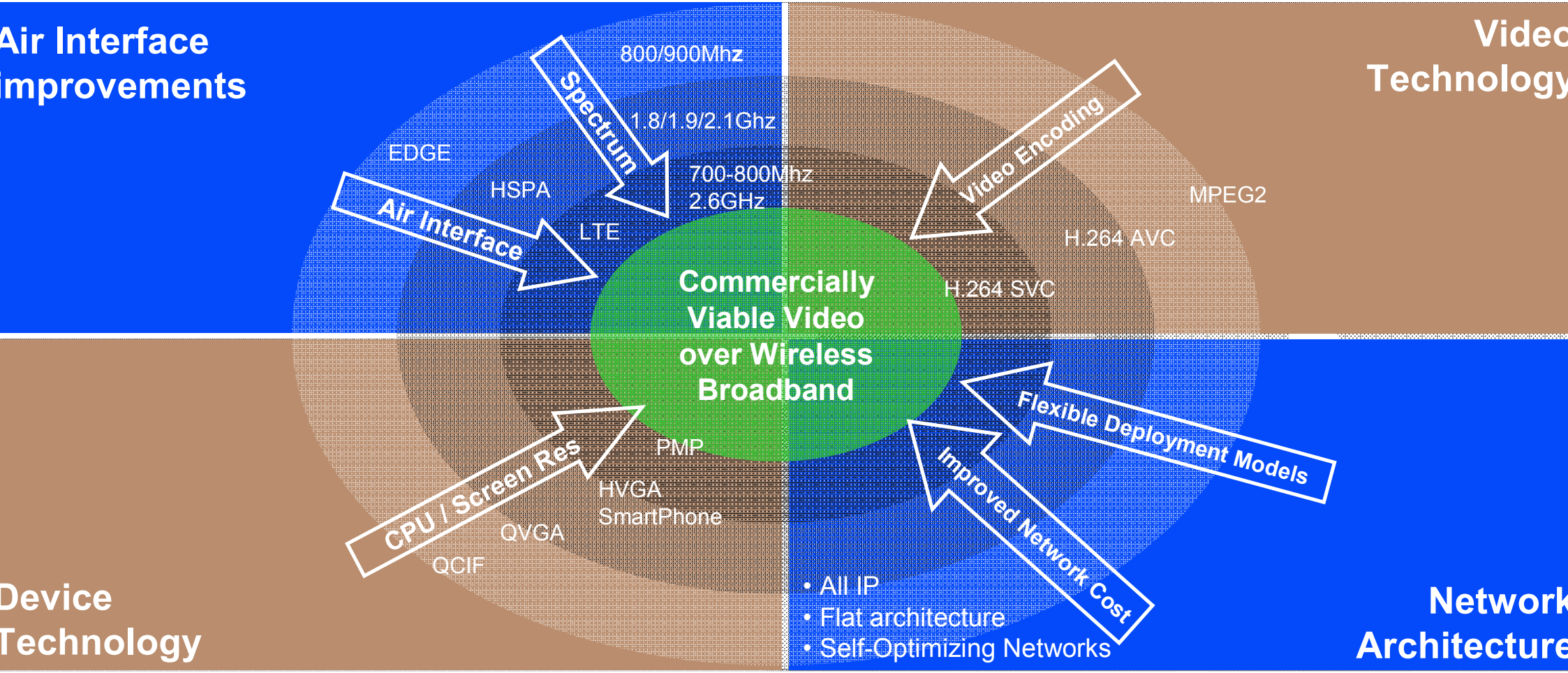
- ANR is expec… o reduce Optimization … tions cost by 86%
- PCI is exp… uce Optimiza… s cost by …%
- …

“Fixed-Line-Equivalent-Broadband” Speed Anywhere

	Call set up time	Latency	Typical Datarate	Web page (500KB)	Youtube HQ video (500kbps) buffering	Email with 4MB attachment
HSPA	A few seconds	70-120ms	0.3-2 Mbps	3.6sec	13.5sec	31.6sec
LTE	15-20ms	12-15ms	1-8 Mbps	0.9sec	2.7sec	7.1sec

Simultaneous QVGA Video Streaming Users per Sector




Air Interface improvements
Video Technology
Device Technology
Network Architecture
800/900Mhz
1.8/1.9/2.1Ghz
700-800Mhz
2.6GHz
Spectrum
EDGE
HSPA
LTE
Air Interface
MPEG2
H.264 AVC
H.264 SVC
Video Encoding
Commercially Viable Video over Wireless Broadband
PMP
HVGA SmartPhone
QVGA
QCIF
CPU / Screen Res
Flexible Deployment Models
Improved Network Cost
• All IP
• Flat architecture
• Self-Optimizing Networks

Index

LTE Self Organizing Network – решение Motorola

Игорь Кокоцкий Ст. консультатнт по поддержке продаж в России и СНГ
Motorola Home & Networks Mobility

Motorola O&M Architectural Principals

- Motorola's LTE solution is designed to take full advantage of the opportunities offered by SON
- Motorola has not constrained the architecture to evolve from the O&M systems of legacy technologies which have not been designed to operate in a SON environment
- The EMS is not required for any critical (service impacting) network functions

LTE Manager

- Lightweight, compact, OAM&P
- Secure operator access and monitoring of the LTE system
- GUI and CLI operator interfaces
- Session Trace
- Software Load Management
- Store-and-Forward of LTE performance and per-call data
- 3GPP compliant North Bound Interfaces

Customer OSS/NMS

Motorola LTE Manager

LTE Manager

- EMS support of eNodeB, MME, SGW, & PGW
- PM & SDL Collection; Short-term Storage, and Forwarding
- Alarm Manager
- NE Software Download and Upgrade
- Role Based Access Control
- Consolidated Inventory Display
- Bulk Configuration Changes
- Automated CM (Policy Rules)

LTE Manager Interfaces

- 3GPP NBI
- SNMPv3 / HTTPS NBI
- Session Trace

LTE Operator Client

- Java Web-Start / Browser
- SSH (CLI) to NE
- HTTPs (Web) to NE

Intelligent Network Elements

- Self Organizing Networks
  - Plug N Play – Auto Inventory
  - Auto Configuration
  - Auto Neighbor Management
  - Self Test
- Active Alarm Reporting
- Intra-NE data validation
- Performance Thresholding
- Role Based Access Control (RBAC)

SON Operation Model

Smart, autonomous NEs, local SON decisions

- Reduces complexity / footprint / availability reqs of EMS
- Local convergence reduces EMS, operator load
- Locally controlled chatter/ping-pong reduces EMS load
- Enables open interface to NE
- Designed for multi-vendor networks

Full review of proposed changes at EMS while establishing trust

Real-time performance in trusted mode

Traditional Operation Model

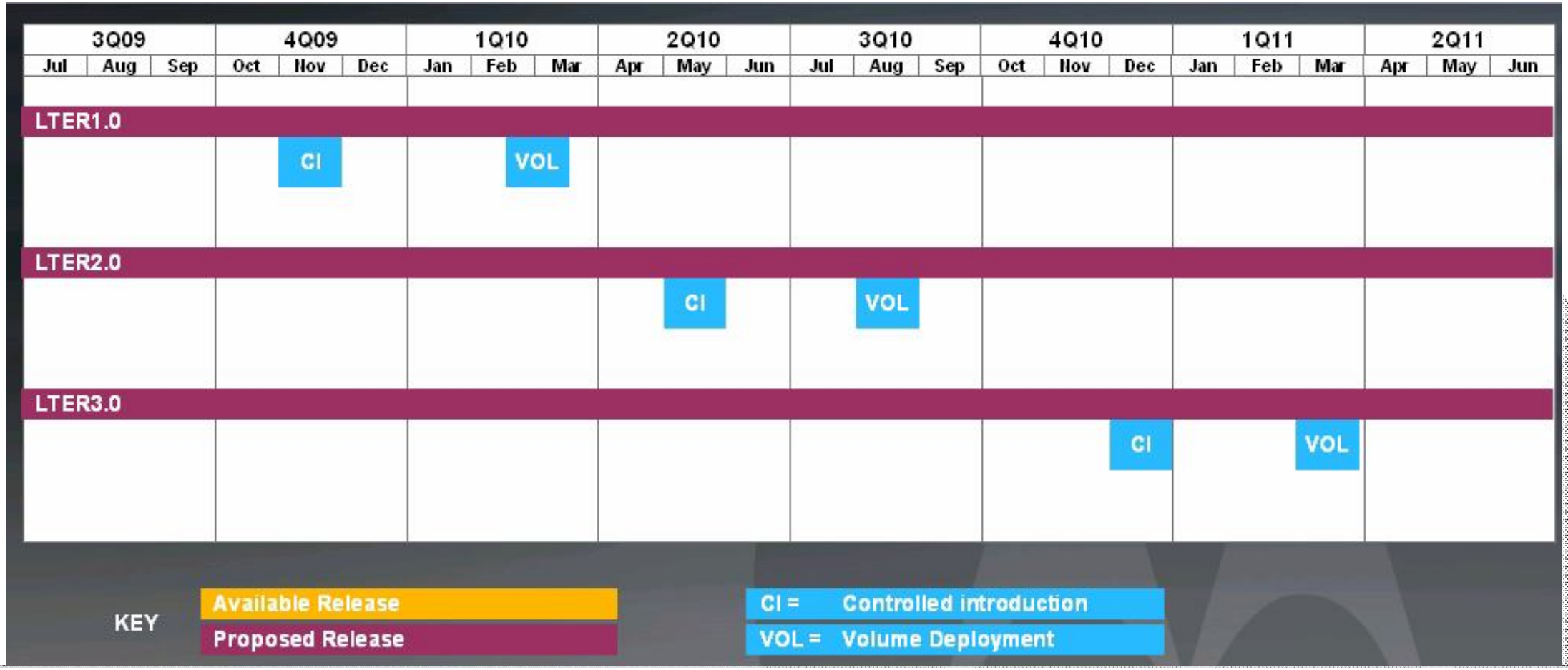
EMS-level SON decision-making

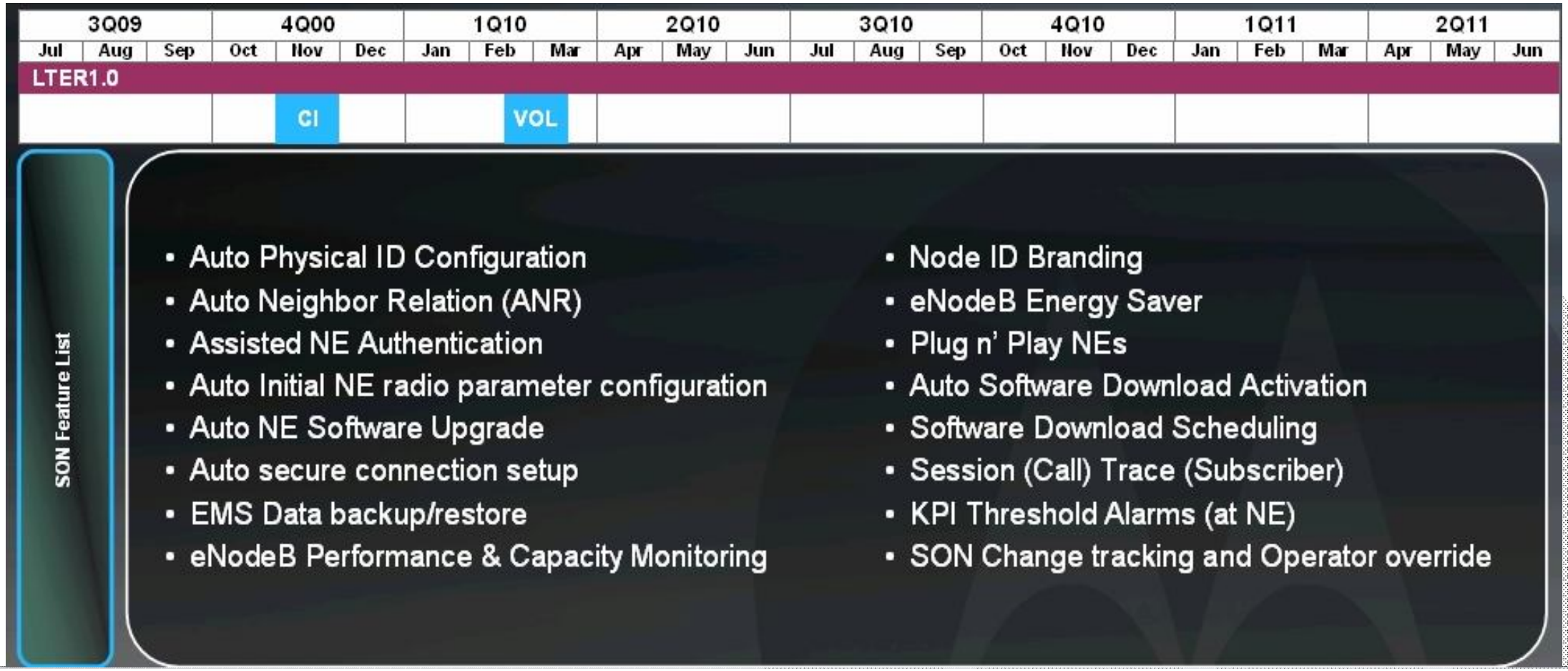
- EMS is critical to system operation
- EMS must handle massive amounts of data to make local SON decisions
- Lack of convergence creates burst issues on EMS
- Chatter/ping-pong creates additional load on EMS
- Discourages multi-vendor networks and open NE interfaces

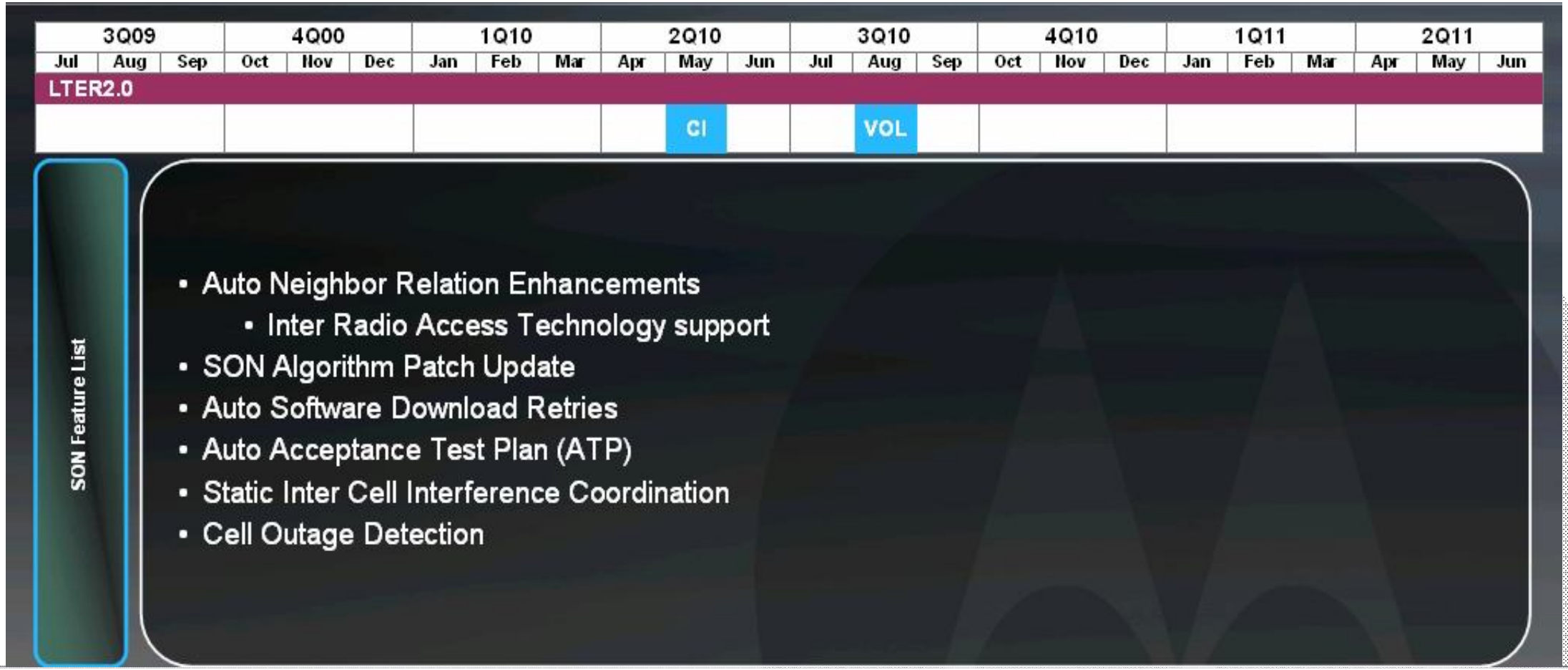
Can allow for full review of changes at EMS while establishing trust

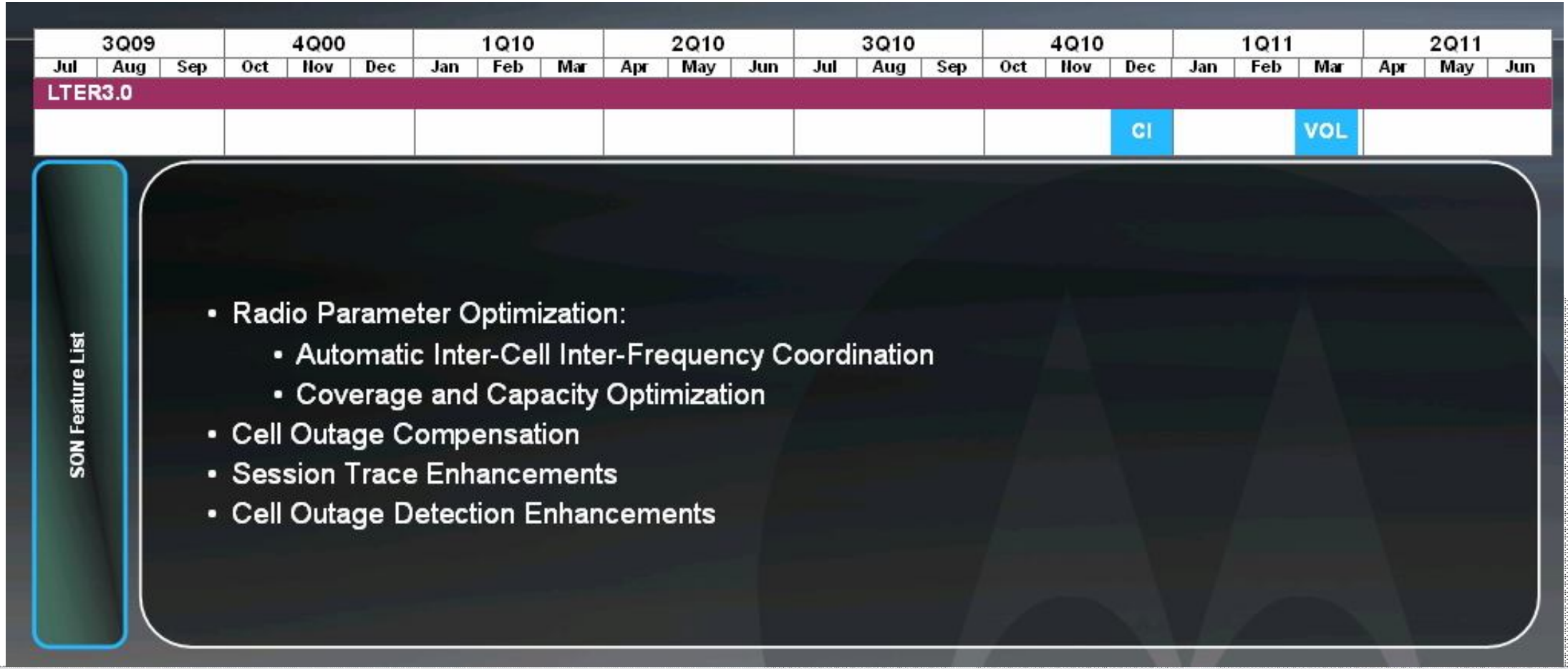
Significant latency when going to trusted mode


LTE SON roadmap strategy is driven by the needs of our customers and having true SON capabilities that are based on where they are in their LTE deployment lifecycle
• Release Theme - Feature set in this release are targeting the theme's capability
• Release may include features that extend beyond this theme
LTER1.0
LTER1.0
Release Theme:
Network Planning
Network Deployment
LTER2.0
LTER2.0
Release Theme:
Network Operations
LTER3.0
LTER3.0
Release Theme:
Network Optimization


3Q09
4Q09
1Q10
2Q10
3Q10
4Q10
1Q11
2Q11
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
LTER1.0
CI
VOL
LTER2.0
CI
VOL
LTER3.0
CI
VOL
KEY
Available Release
Proposed Release
CI = Controlled introduction
VOL = Volume Deployment


3Q09
4Q00
1Q10
2Q10
3Q10
4Q10
1Q11
2Q11
Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun
LTER1.0
CI
VOL
SON Feature List
• Auto Physical ID Configuration
• Auto Neighbor Relation (ANR)
• Assisted NE Authentication
• Auto Initial NE radio parameter configuration
• Auto NE Software Upgrade
• Auto secure connection setup
• EMS Data backup/restore
• eNodeB Performance & Capacity Monitoring
• Node ID Branding
• eNodeB Energy Saver
• Plug n' Play NEs
• Auto Software Download Activation
• Software Download Scheduling
• Session (Call) Trace (Subscriber)
• KPI Threshold Alarms (at NE)
• SON Change tracking and Operator override


3Q09
4Q00
1Q10
2Q10
3Q10
4Q10
1Q11
2Q11
Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun
LTER2.0
CI
VOL
SON Feature List
• Auto Neighbor Relation Enhancements
• Inter Radio Access Technology support
• SON Algorithm Patch Update
• Auto Software Download Retries
• Auto Acceptance Test Plan (ATP)
• Static Inter Cell Interference Coordination
• Cell Outage Detection


3Q09
4Q00
1Q10
2Q10
3Q10
4Q10
1Q11
2Q11
Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun
LTER3.0
CI
VOL
SON Feature List
• Radio Parameter Optimization:
• Automatic Inter-Cell Inter-Frequency Coordination
• Coverage and Capacity Optimization
• Cell Outage Compensation
• Session Trace Enhancements
• Cell Outage Detection Enhancements

3Q09			4Q00			1Q10			2Q10			3Q10			4Q10			1Q11			2Q11		
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
LTER3.0+																							

SON Feature List

- Radio Parameter Optimization:
  - Interference Control
  - HO parameterization optimization
  - QoS related parameter optimization
  - Optimization Scenarios with Home eNB
- RACH Optimization
- Handoff Optimization: Load Balancing
- Transport Parameter Optimization:
  - Routing Optimization
  - Optimization Scenarios with Home eNB

Principles of Operation

- As defined by 3GPP 36.300
- UE reports neighbour
- Serving Cell asks for Global CID
- UE reports Global CID of Neighbour
- Serving Cell adds neighbour

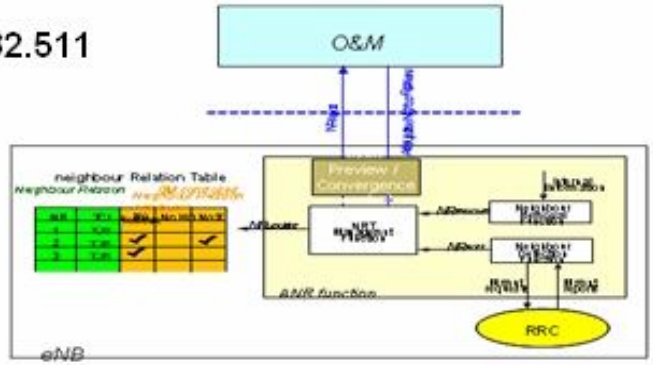
O&M aspects

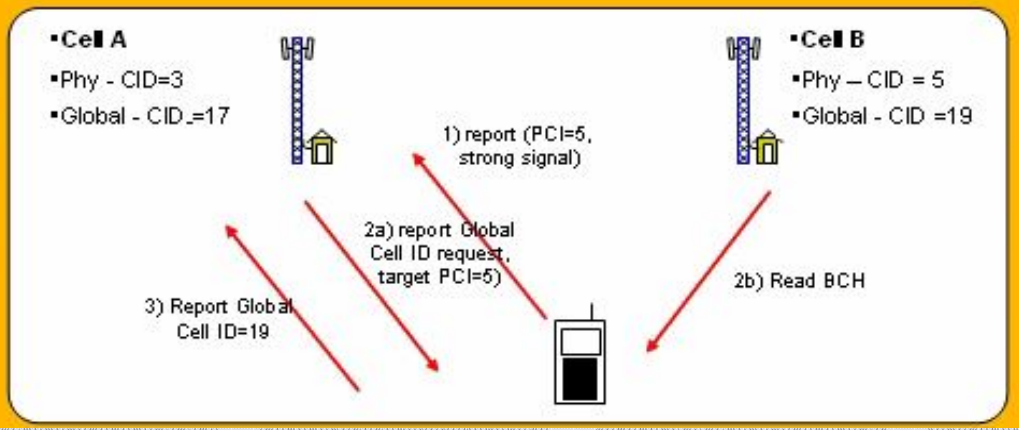
- As defined by 3GPP 36.300 / 32.511
- O&M interface enables;
  - *White-listing & Black-listing*

Motorola Differentiators

- Preview Mode
- Convergence
- Reciprocal Neighbours

As Defined in
3GPP 36.300 / 32.511





PCI Requirement

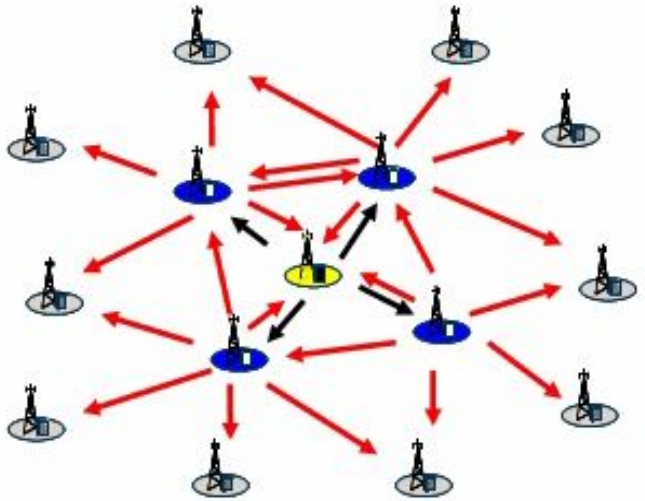
- "collision-free": the PCI is unique in the area that the cell covers
- "confusion-free": a cell shall not have neighboring cells with identical PCI

The PCI Challenge

- Create autonomous solution for deriving PCI
- PCI must be derived from some combination of neighbour configuration, neighbour stats, and UE measurements.
- Therefore a cell must be operational before the System can acquire the data needed to calculate a geographical unique PCI
- Neighbour level uniqueness is a requirement
- 36.423 enables the exchange of neighbour lists such that we can calculate a PCI that is unique in the wider geographical area

Motorola Differentiators

- Utilizes a temporary ID to address the PCI challenge
- Automatically responds to detected changes in Network topology



Plug N' Play Requirements

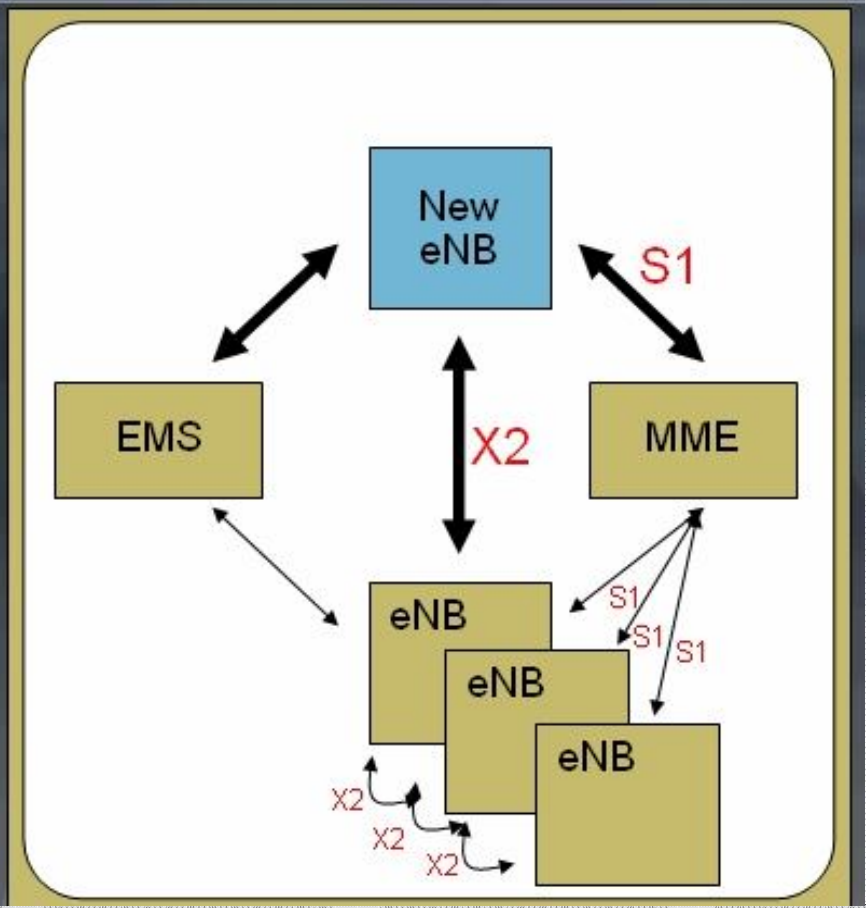
- Auto establishment of new eNodeB in the network

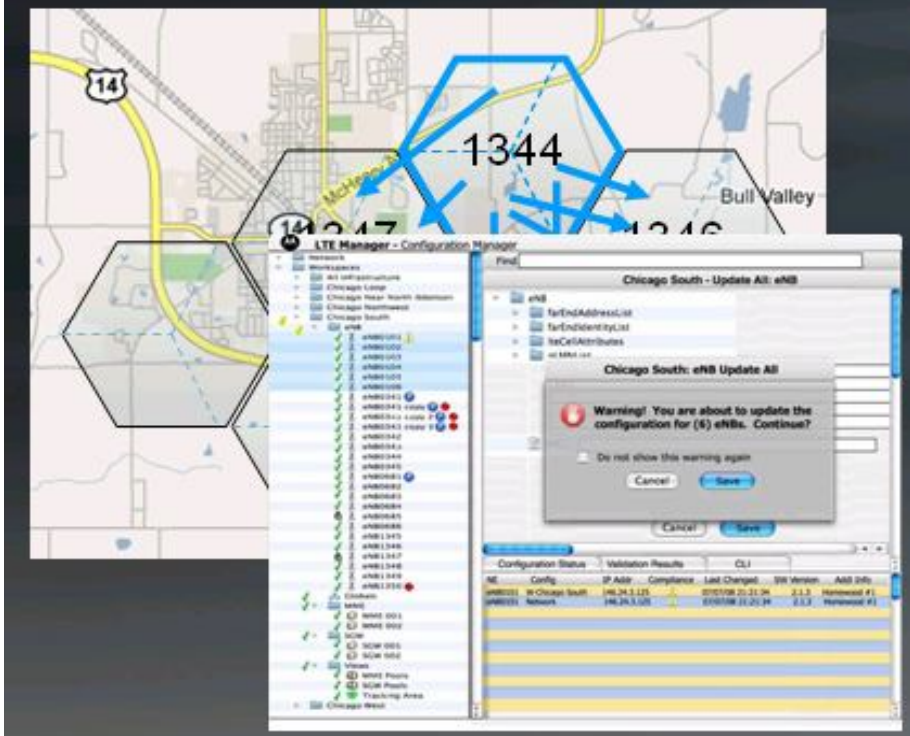
Plug N' Play Mode Capabilities

- Auto-provisioning of hardware configuration
- Automatic neighbor management and optimization
- Internal network element data rules checking
- Self-derived data
- Self-allocation of resources

Motorola Differentiators

- Auto configuration of transport / backhaul
- Auto initial NE radio parameter configuration
- Auto NE software upgrade
- Auto secure connection setup





Preview Mode Requirements

- Allows the Operator to gain confidence in SON capability

The Preview Mode Challenge

- Provide simple mechanism to commit changes
- Provide careful tracking and reporting of changes
- Make sure new processes fit into existing operations workflow

Motorola Differentiators

- Enabled on a per network element and per SON functional basis
- Allows user to review each configuration change & fault recovery action
- Processes fit into existing operations workflow

Transport Requirements

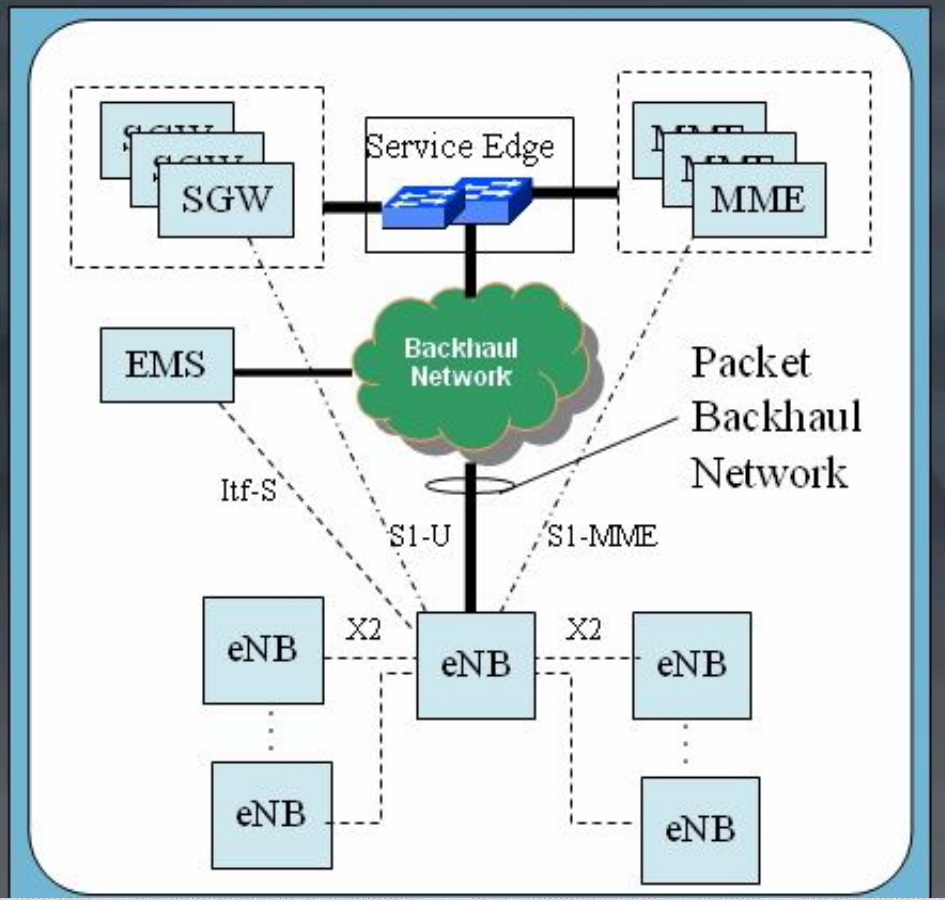
- eNodeB transport self configuration communication
- Transport configuration parameter management with minimal set of operator intervention
  - *Minimal set of pre-installation parameter configuration*

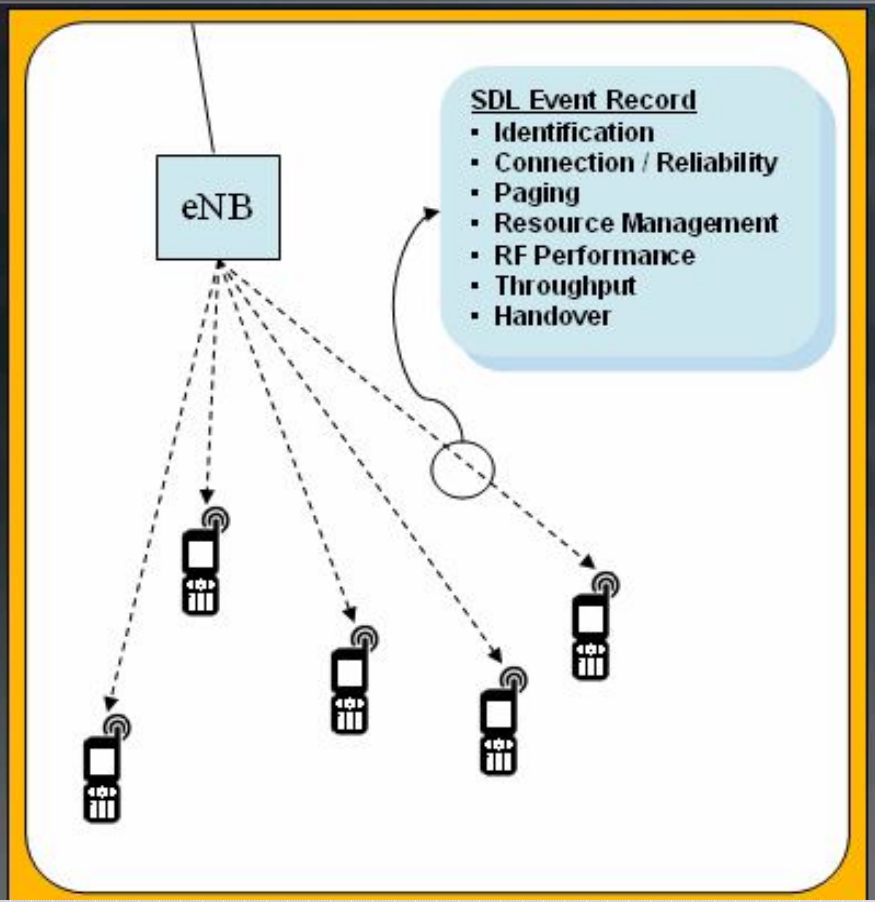
Key Network Elements

- 4 Network Elements need to communicate with an eNodeB:
- SGW, MME, EMS and other eNBs

Motorola Differentiators

- Reducing number of parameters configured for eNB
  - *Defaulted, learned, and downloaded*
  - *MME pool identifier*
  - *Client ID used for DHCP*
- Extension to standards based O&M Node Identification
- Reduced operator interaction with auto-deployed transport workflows





Session Data Log Principles

- Session detail logs (SDLs) are per UE information records
- Generated on a per session event basis and stored within the system
- Provide information on UE connection usage, RF characteristics, connection performance, failure causes, etc.

SDL use in SON

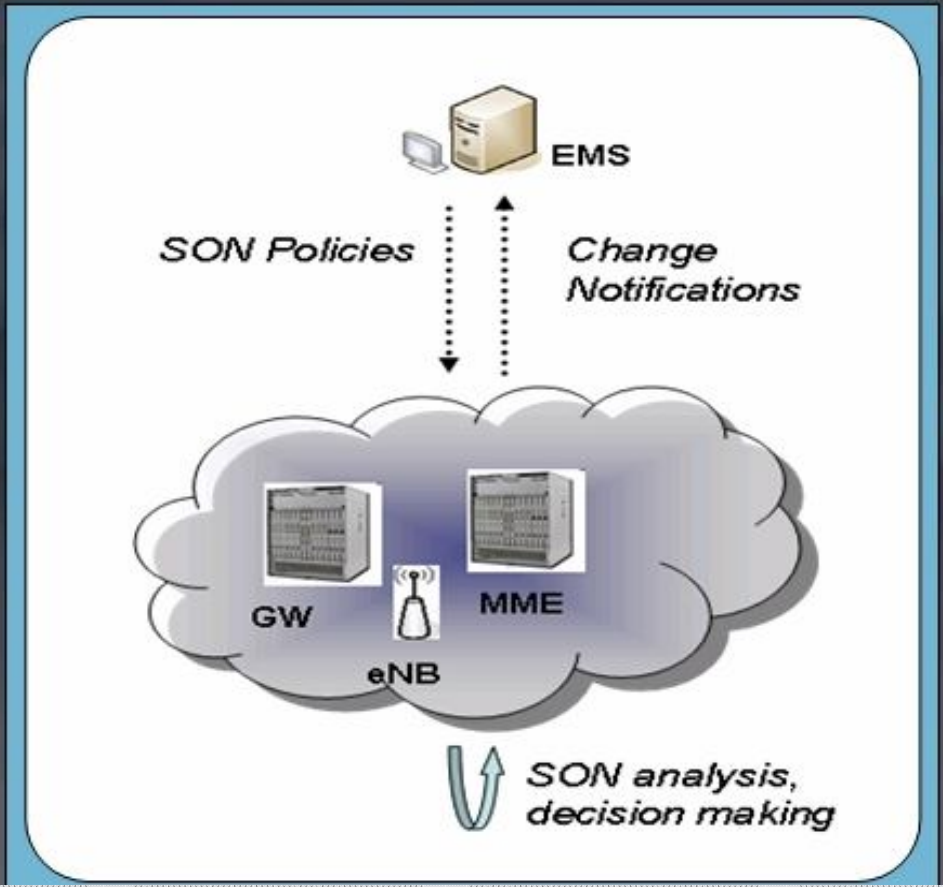
- Use in conjunction with X2 Data, PM Statistics, and Configuration Management Information
- Leveraging SDL information into SON optimization engine

Motorola Differentiators

- Correlate performance against a vast number of factors
- Managed on a per connection basis
- Improving understanding of driving performance factors
- Enabling targeted optimization

Smart, autonomous NEs, with local SON decision making

- Reduces complexity, footprint and availability requirements of EMS
- Locally controlled chatter/ping-pong reduces EMS, operator load
- Enables open interface to Network Elements, optimal for multi-vendor networks
- Real-time performance in automatic mode
- Less backhaul traffic as intelligence distributed to eNodeB
- No CPU bottleneck as in the centralized server model



- Significant investment in SON capabilities over the past 3 years
- Established Autonomics Laboratory in 2005 to enable self-configuring, self-healing, self-optimizing, and self-protecting infrastructure, including hiring key industry experts.
- New operability architecture based on SON concepts established across Networks and Public Safety businesses in 2006
- First delivery of SON-based management system and agent technology completed in 2007
- Custom Built Compute Array designed for LTE Link and System Simulators and System Analysis Tools
- GSM MVIOS knowledge driving SON experience
- IOS underlying algorithms are being implemented for LTE relase 1
- OFDM model for monitoring events is event driven and structured like GSM

Motorola LTE System Simulator


Network Planning
Projected Operations Staff Productivity Increase*
65%
Effort Savings
39%
Network Deployment
Projected Operations Staff Productivity Increase*
75%
Effort Savings
43%
Network Operations
Projected Operations Staff Productivity Increase*
80%
Effort Savings
44%
Network Optimization
Projected Operations Staff Productivity Increase*
80%
Effort Savings
44%

April 8, 2009

CTIA Emerging Technology Awards 2009:
LTE: SON - 4G – 3rd Place in Service Management Category

Award Information

The CTIA Emerging Technology Awards, or "E-Tech" Awards, program is where the newest, most innovative products and applications get the exposure and industry recognition that they deserve.

April 22, 2009

Next Generation Networks Leadership Award 2009:
LTE: SON Self Optimizing Networks

Award Information

Recognize and publicize outstanding achievements in the IP Communications community and their superlative products, services and technologies relating to the deployment of next-generation networks.

EXPERTISE

Motorola has expertise in self-organizing networks based on our significant early commitment to autonomics and the Motorola reduced-OPEX architecture.

LEADERSHIP

Motorola is the leader in Self Organizing Networks, developing more SON capability earlier than any other vendor and more advanced solutions targeted towards the needs of operators as they deploy LTE

PARTNERSHIP

Motorola wants to work up-front with it customers to ensure the SON capabilities deployed in LTE meet the market needs for planning, deployment, operations and optimization.

Delivering an Accelerated Transition to 4G Media Mobility

Решение Motorola LTE готово уже в 2009

Спасибо!

Игорь Кокоцкий, tfg786@motorola.com