ITU Regional Development Forum 2008 for the CIS, CEE and Baltic States

"Bridging the ICT standardization gap in developing countries"

Tashkent, Uzbekistan, 10-11 June 2008

Network Architecture in the evolution of NGN and OSS/BSS

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Network Architecture towards NGN
Content

- Key factors for the evolution towards NGN
  - Services and revenue motivations.
  - Requirements and issues
- Network architecture consolidation at transit, local and access levels
  - Topology and architecture migration
- OSS/BSS evolution

Network Architecture towards NGN

Key Factors: Motivation

- **New services and revenue** increase with multimedia services:
  - Compensate voice revenue reduction and increase BB related business
- **Cost reductions** by sharing network infrastructure and systems
  - Savings are a function of network scenario, equipment modernization status and customers grow speed
- **Simplification of O&M**, thus lowering OPEX
  - Integrated operation platforms, maintenance and training

Network Architecture towards NGN
Key Factors: Operator Requirements (I)

- **Business continuity** required to maintain ongoing dominant services and customers that require carrier-grade service

- **Flexibility** to incorporate existing new services and react quickly to the ones that appear on real time (main advantage of IP mode)

- **Profitability** to allow feasible return on investments and in the best practices market values

Network Architecture towards NGN
Key Factors: Operator Requirements (II)

- **Survivability** to allow service assurance in case of failures and external unexpected events

- **Quality of Service** to guarantee the **Service Level Agreements** for different traffic mixes, conditions and overload.

- **Interoperabilty across networks** to allow to carry end to end services for flows in different network domains

Network Architecture towards NGN
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  - **Requirements and issues**
- **Network architecture consolidation at transit, local and access levels**
  - **Topology and architecture migration**
- **OSS/BSS evolution**

Network Architecture towards NGN

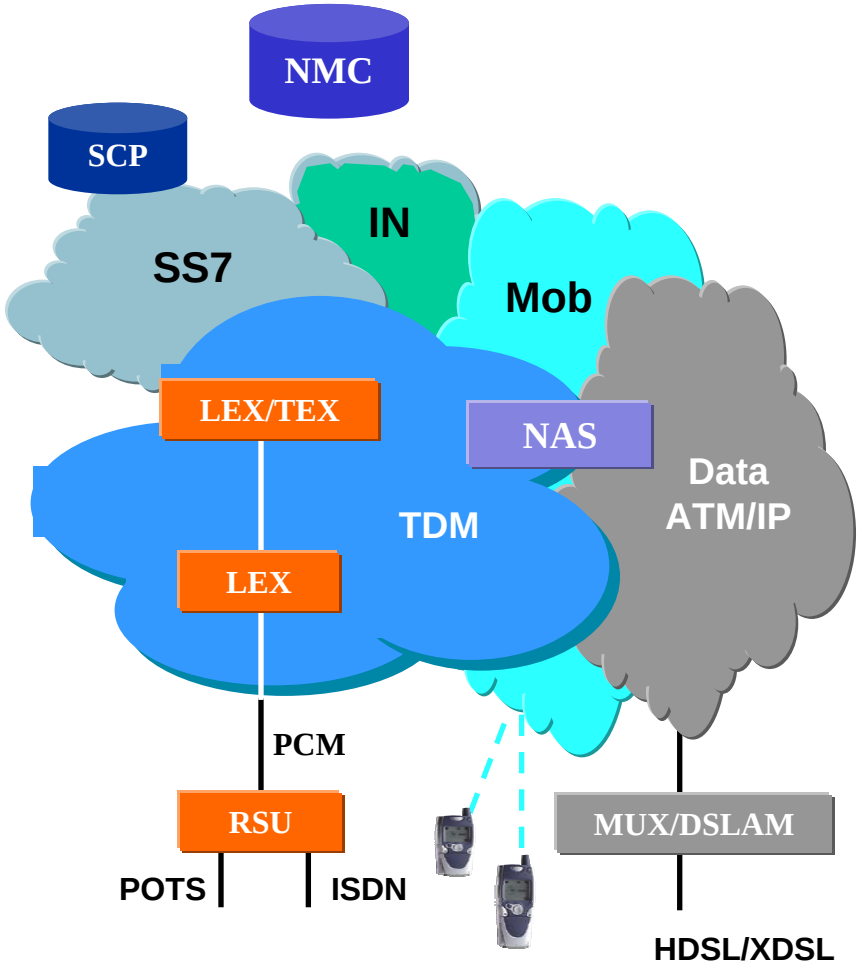
Architecture Consolidation: Topology

Topological changes impact on infrastructure and are slower to implement than technology substitution

- **Less network nodes and links** due to the higher capacity of systems (one order of magnitude).
- **Same capillarity** at access level due to identical customer location
- Topological **connectivity higher** for high capacity nodes and paths due to security
- **High protection** level and diversity paths/sources in all high capacity systems, both at functional and physical levels

Network Architecture towards NGN

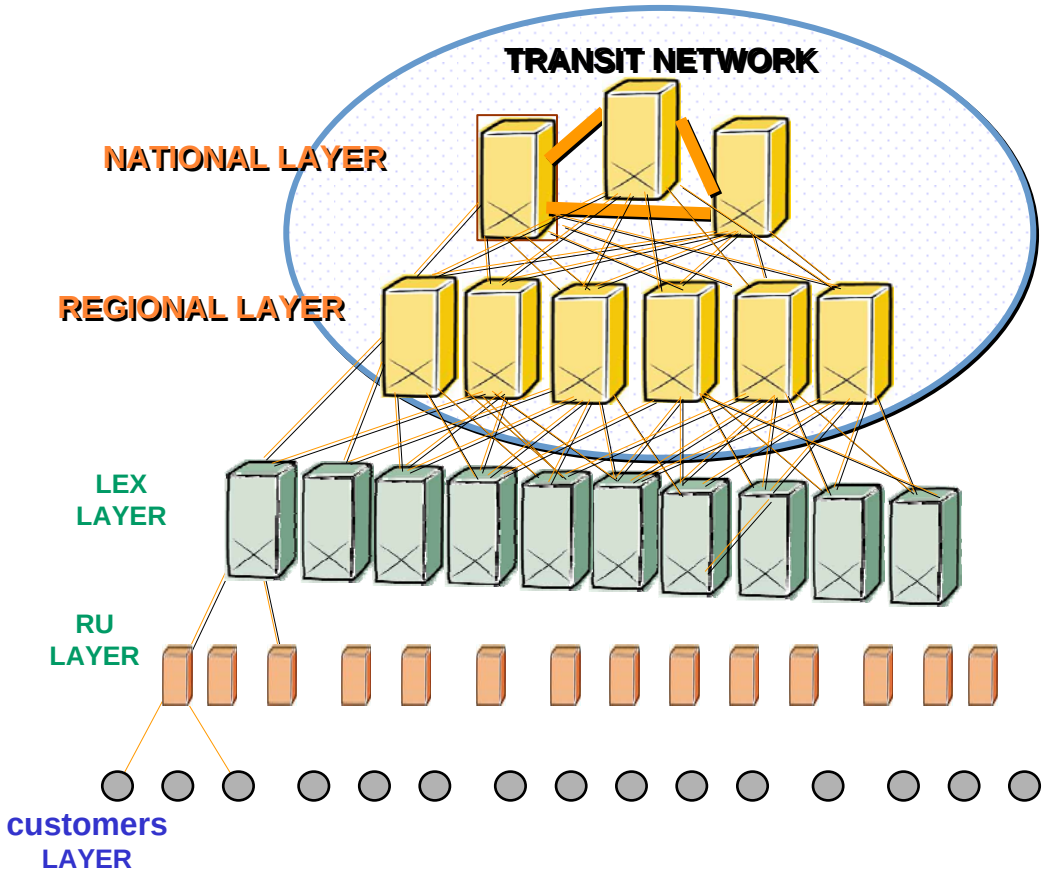
Existing networks and architecture



- 5 different network types to handle telecom services
- TDM for fixed and mobile networks working in circuit mode with end to end reserved paths
- SS7 and IN network working with message switching mode
- Data network working with leased lines and packet mode with different and conventional IP protocols

Network Architecture towards NGN

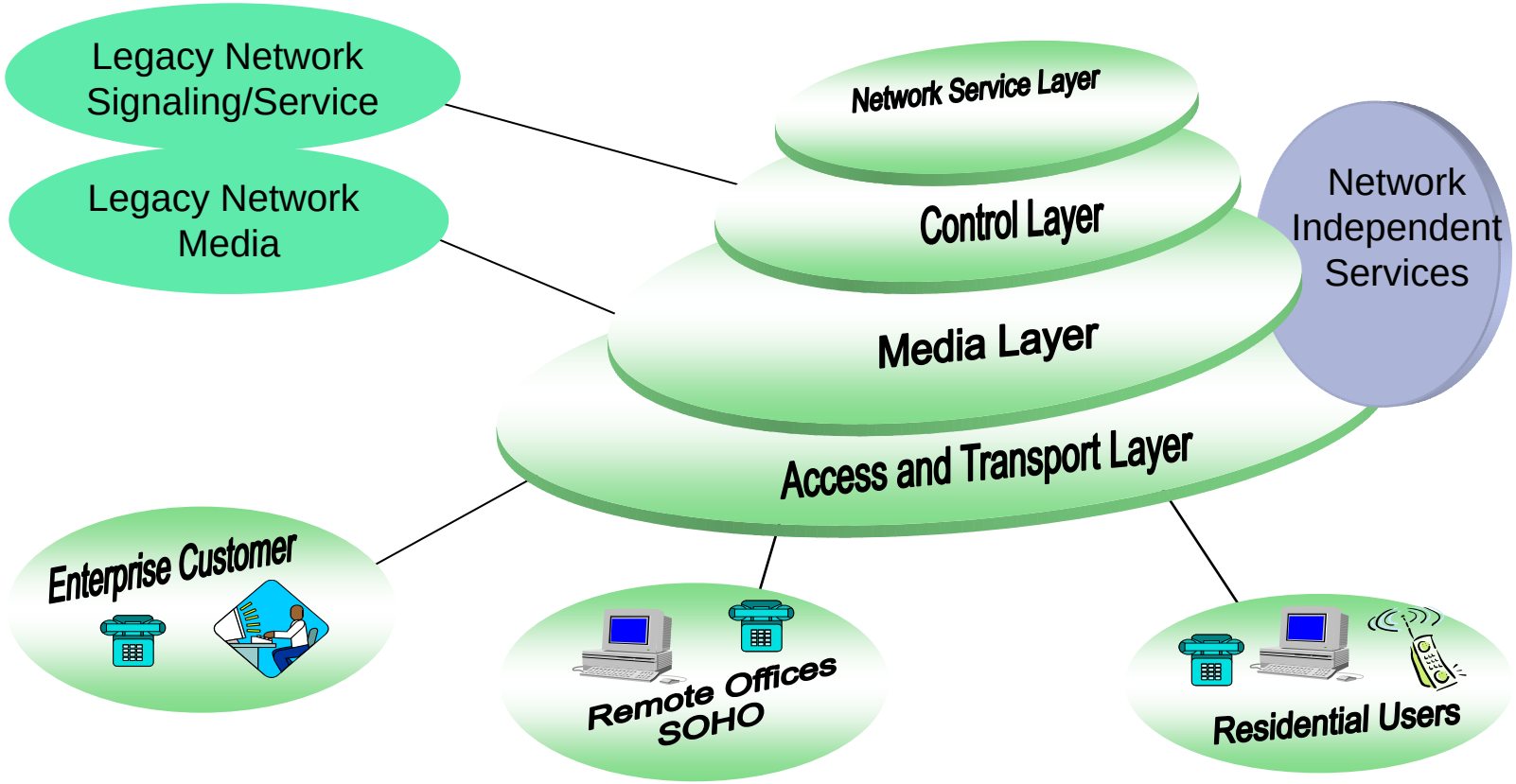
Existing networks and architecture



- Hierarchical topology with 4 to 5 layers, connectivity to the upper next layer and within each layer as a function of economical optimization
- Number of nodes as a function of O/D traffic and nodes capacity
- Service handling for media, signaling and control at all exchange nodes
- Carrier grade quality with well defined QoS criteria and standardized engineering rules

Network Architecture towards NGN

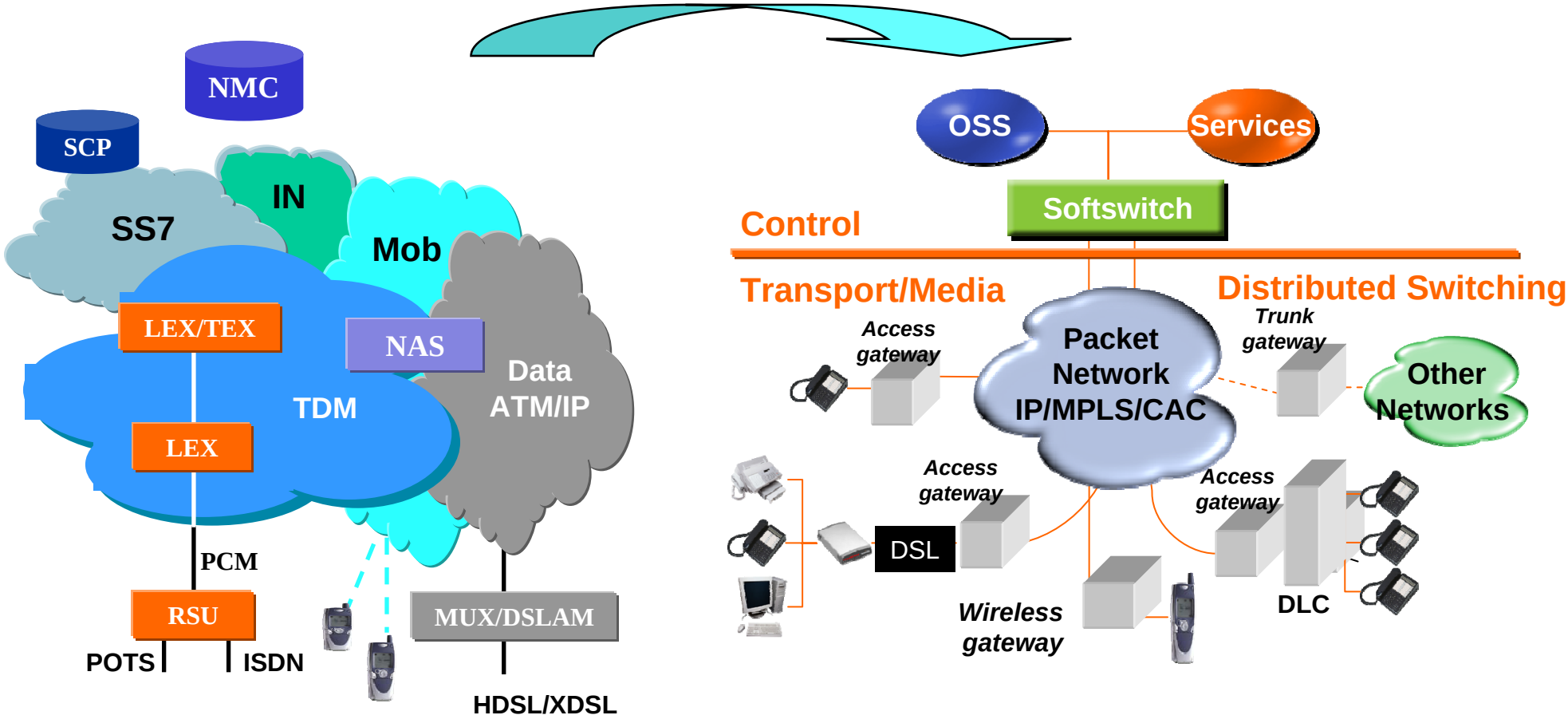
Architecture: NGN Layers



Network Architecture towards NGN

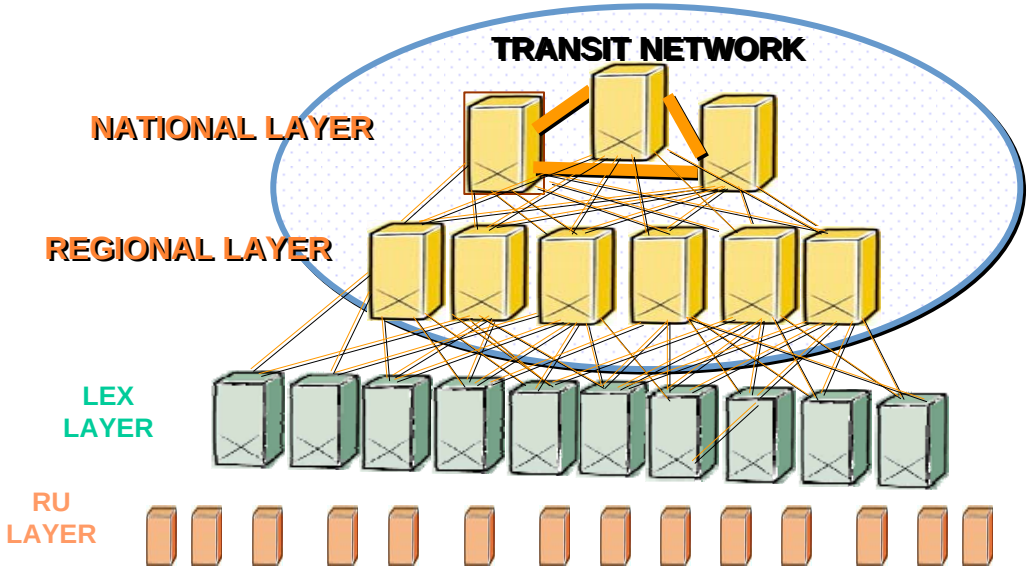
Architecture migration: Topology

What changes from current scenario towards target network ?

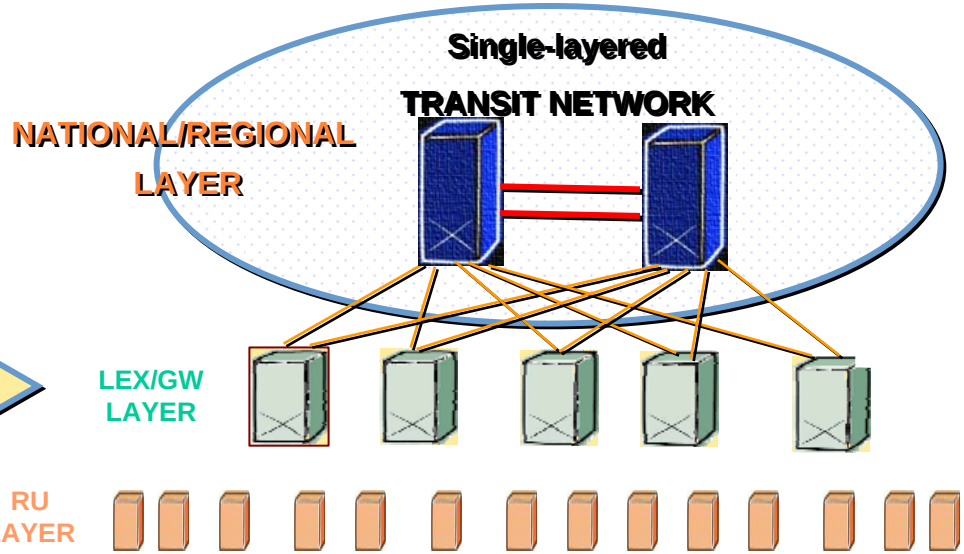


Network Architecture towards NGN

Architecture Consolidation: Topology



Structure Simplification



Network Architecture towards NGN

Architecture Consolidation: Access

Access dominated by physical infrastructure cost and deployment time

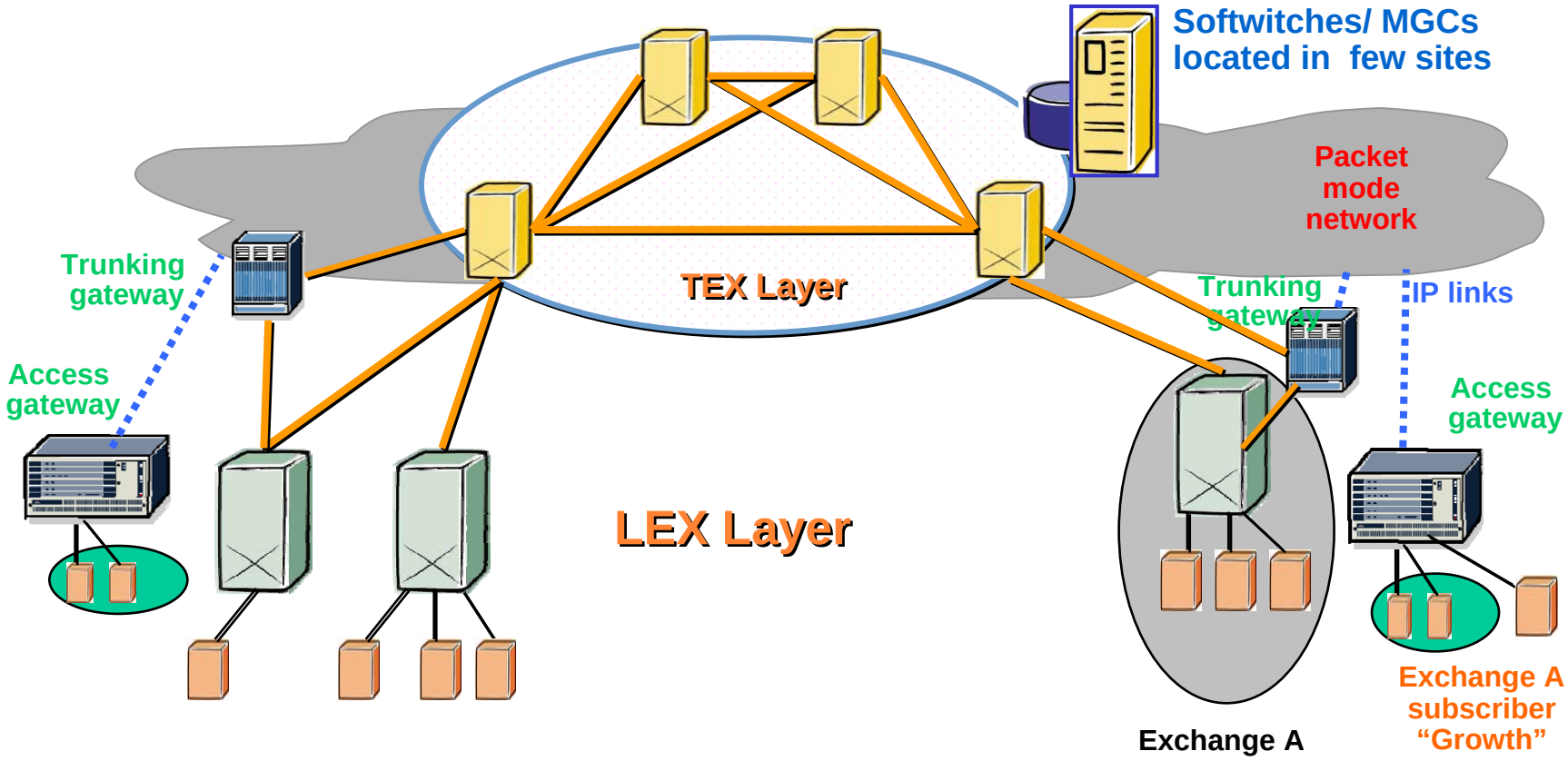
- Quick deployment of DSL and Multimedia Services
- FO closer to customer when implementing new outside plant or renovating existing one
- New Wireless technologies for low density customer scenarios
- Shorter LL length than classical network to be prepared for high bandwidth Multimedia services

Network Architecture towards NGN
Architecture Consolidation: Local

Dominated by functions migration investment and interoperability

- Move from joint switching and control to separated control and media GW
- Introduce Multimedia Services at all areas
- Optimize number, location of nodes and interfaces among existing and new network
- Requires longer time and higher investments due to variety of geo-scenarios and geographical distribution

Network Architecture towards NGN
Architecture Consolidation: Local



Network Architecture towards NGN

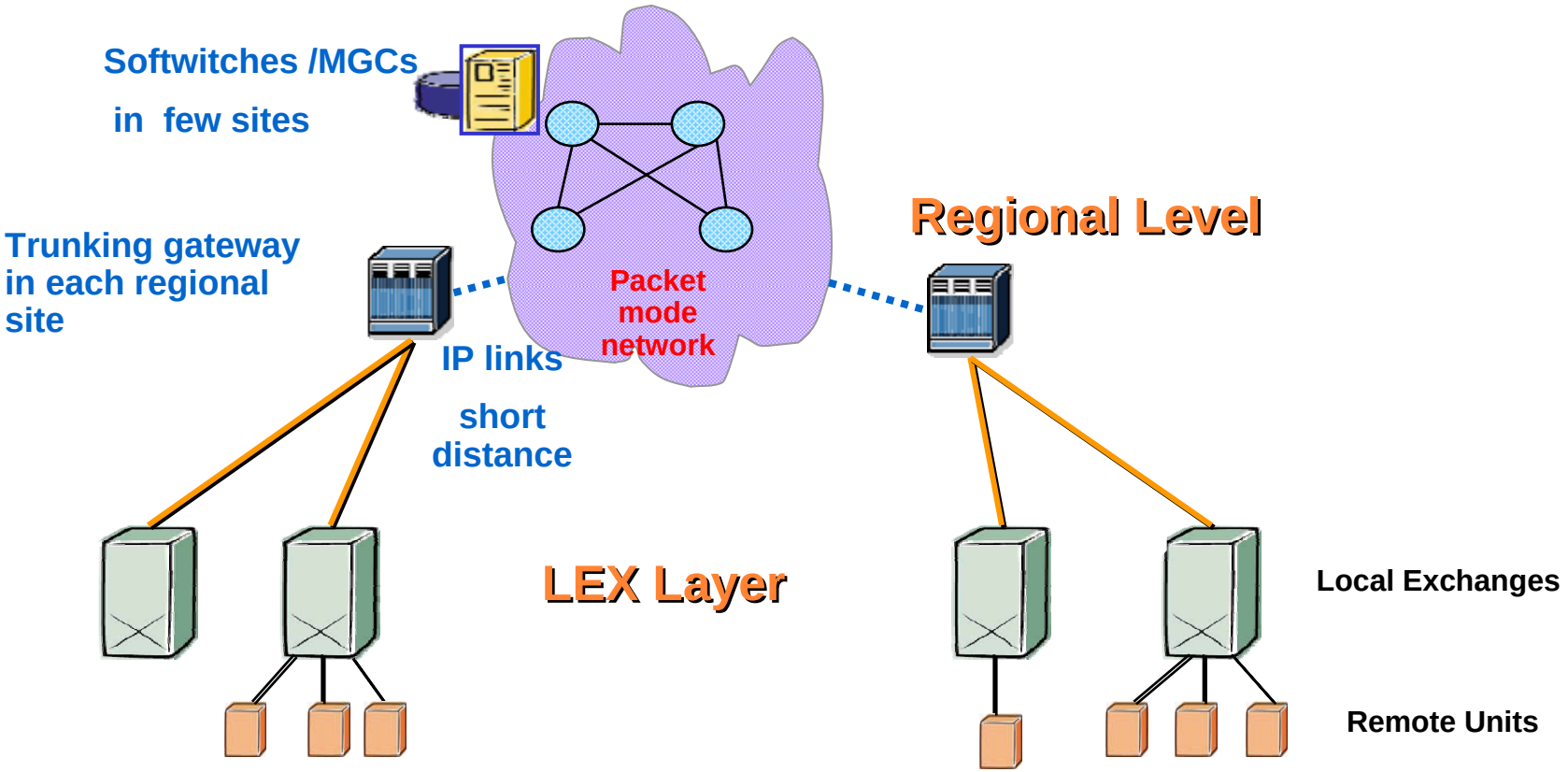
Architecture Consolidation: Core

Dominated by high capacity and protection level

- Overlay deployment for full coverage in all regions
- Quick deployment needed for homogeneous end to end connections
- Strong requirements for high quality, protection and survivability
- Importance of the optimization for location and interconnection

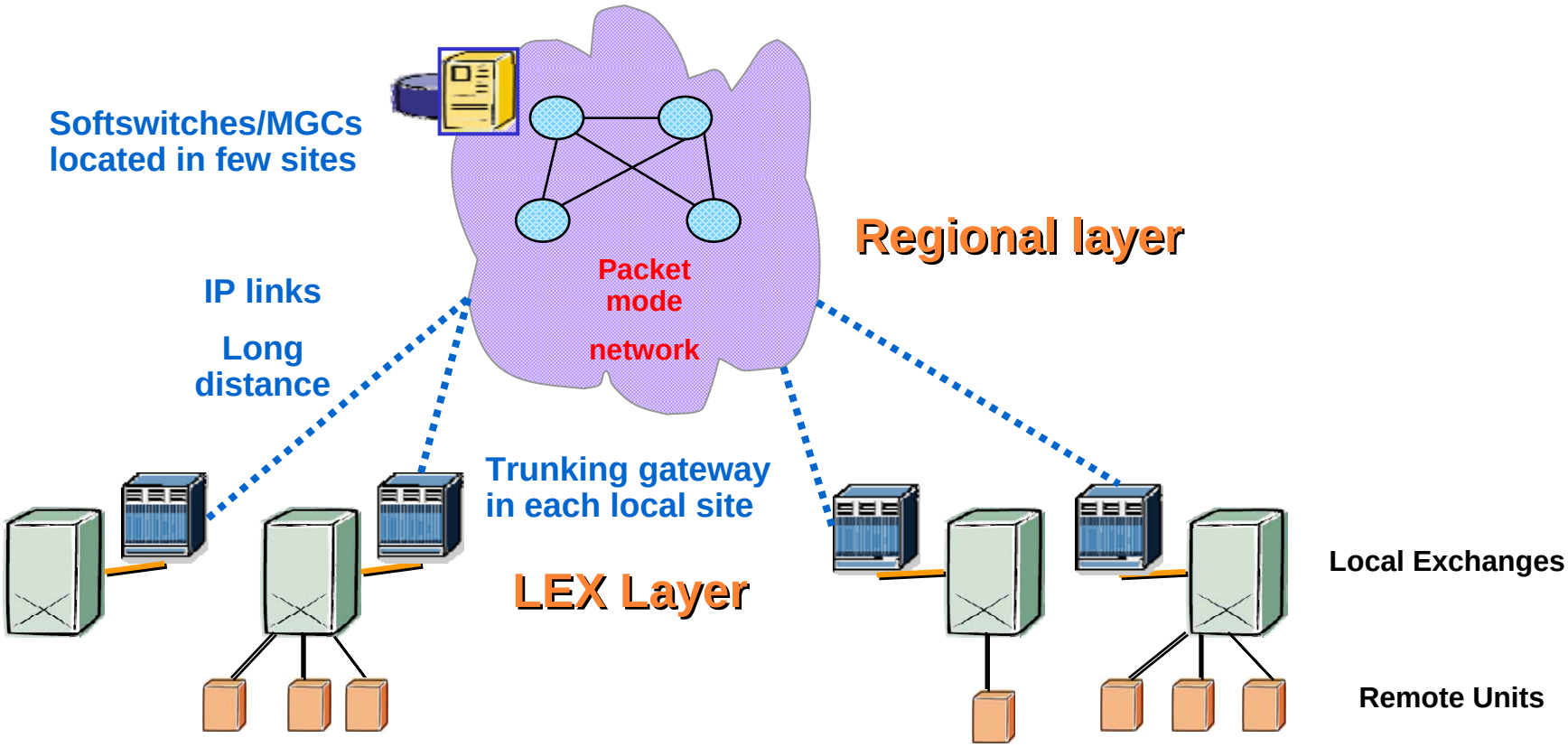
Network Architecture towards NGN

Architecture Consolidation: Core



Network Architecture towards NGN

Architecture Consolidation: Core



Network Architecture towards NGN
Architecture Consolidation: Combined Segments

Where to start and how to co-ordinate migration?

- Network "consolidation"

Cost Optimisation of the network

- Reducing nodes and increase their capacity
- Deployment of ADSL and multiservice access

- Network expansion

NGN solution :

- Cap and Grow; this means keeping the existing PSTN network as it is, and grow demand with NGN equipment

- Network replacement

Replacement of out-phased (end of life) TDM equipment

- gradual replacement : this means coexistence of the two technologies
- full accelerated replacement with a short transition period

Need to optimize overall network evolution: technically and economically

Network Architecture towards NGN
Architecture Consolidation: Combined Segments

Overall impact of evolution on network CAPEX and OPEX

CAPEX

- TDM and NGN CAPEX are close
- NGN CAPEX in the first years driven by geographic coverage
- Access systems represent a large part of CAPEX
  - similar values in TDM and NGN

OPEX

- OPEX in NGN trends to be lower
- Migration scenarios will have a mix of TDM OPEX (installed base) and NGN OPEX (substitution and growth)
- Significant impact of manpower cost due to convergence in operations

Key factors for the evaluation: Geo-scenarios, Network grow rates, Aging of equipment, New services

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- **OSS/BSS evolution**

Network Architecture towards NGN
Evolution to converged OSS BSS: New requirements

Typical functions for the OSS and BSS imply a vast set of activities in current networks like:

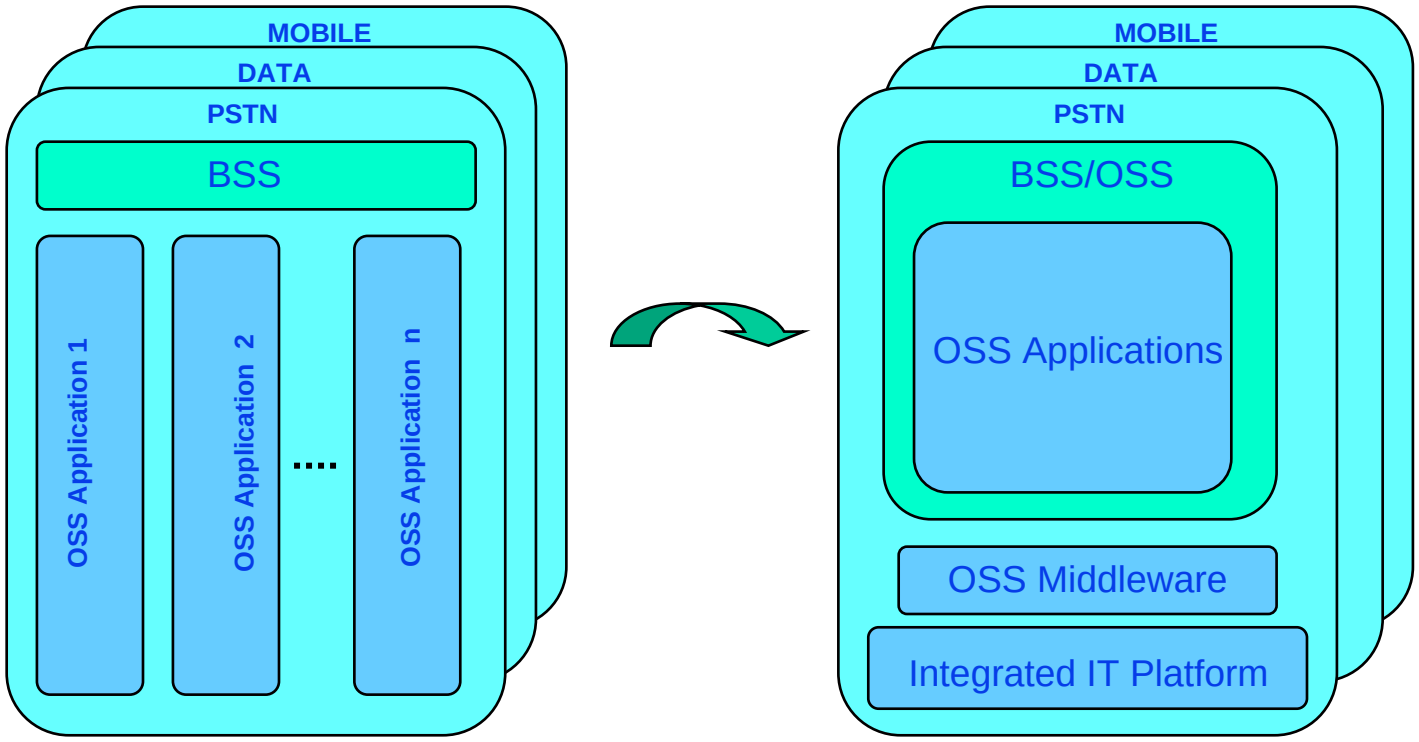
- Inventory management,
- Network engineering,
- Order management,
- Network elements supervision,
- Application monitoring,
- Traffic measurement and post processing,
- Capacity augmentation,
- Routing planning,
- Trouble ticketing,
- Repair management,
- Workforce management,
- Service activation,
- Service creation,
- Customer Relations Management (CRM),
- Rating,
- Billing,
- Invoicing,
- Performance supervision,
- Accounting management,
- Pricing agreements,
- SLA management
- Support to Marketing & Sales, etc

Network Architecture towards NGN
Evolution to converged OSS BSS: New requirements

- **In addition to conventional typical functions, new requirements and higher relevance for existing tasks are needed in the NGN IP mode technology as follows:**

- Managing support to multimedia services with voice, data, video and multiple play
- Security policy management,
- Content management,
- Managing interdomain operational activities
- Managing functionalities for the coexistence of legacy and new technologies
- Implementing new business procedures associated to bundled offers
- Service Level Agreements (SLA) management,
- Churn and customer attraction management,
- Customer equipment inventory,
- Fraud management,
- Service upgrading management,
- Focus on common processes to all support functions, etc.

Network Architecture towards NGN
Evolution to converged OSS BSS: Phases

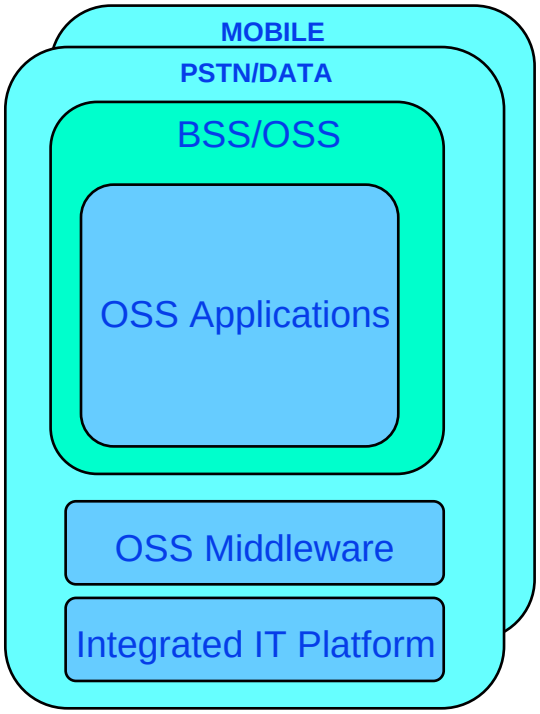


Separated OSS, BSS and Platforms

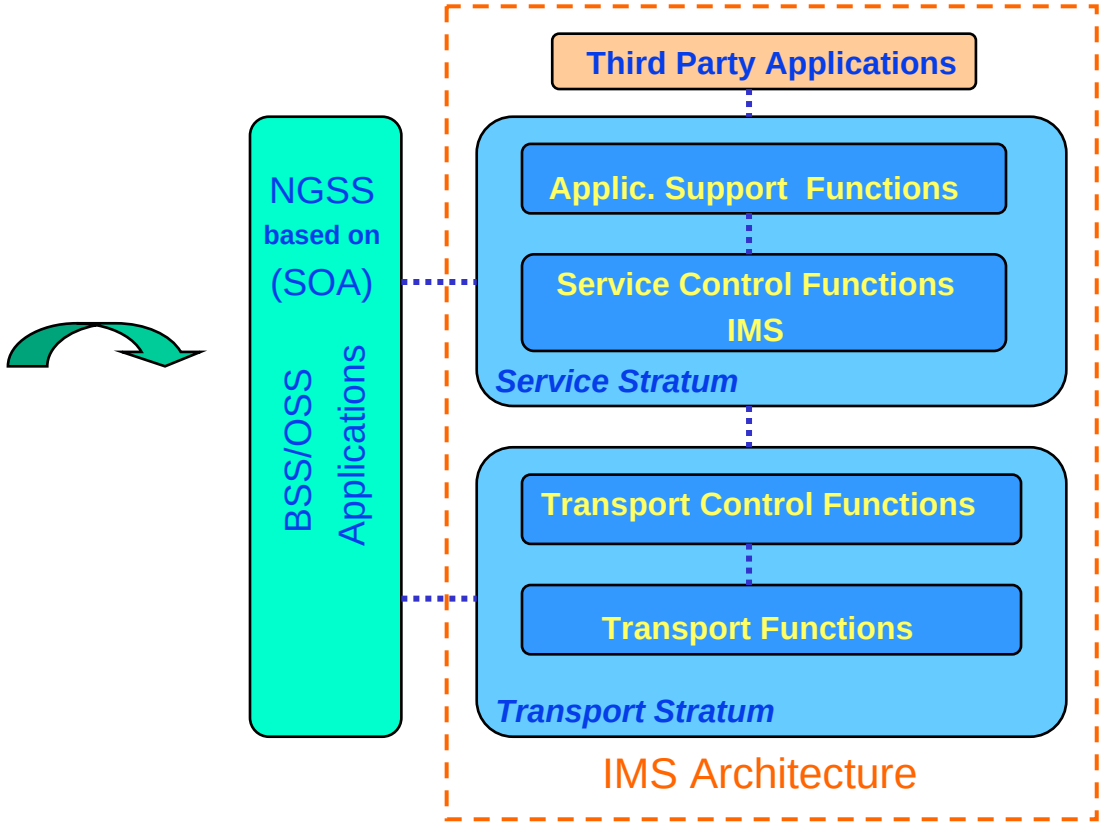
Integrated OSS/BSS in Common Platform

Migration from legacy support systems in vertical piles towards integrated OSS/BSS in an IT platform per network type

Network Architecture towards NGN
Evolution to converged OSS BSS: Phases



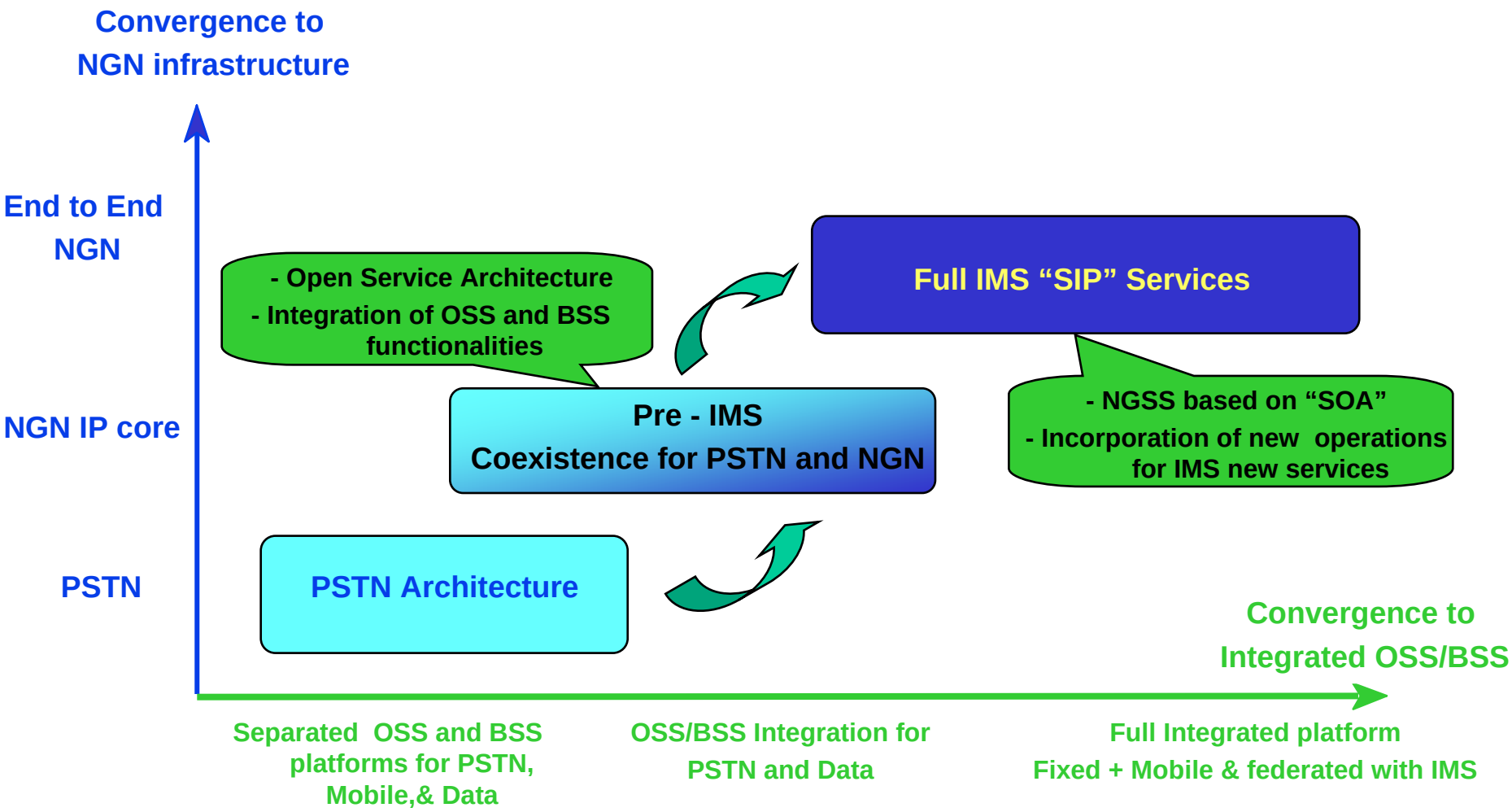
Integrated OSS/BSS in Common Platform



Full Integrated NGSS platform interworking with IMS

Migration from IT platforms per network type towards New Generation OSS/BSS for an NGN multiservice network with IMS functionality

Network Architecture towards NGN
Evolution to converged OSS BSS: Phases



Network Architecture towards NGN
Evolution to converged OSS BSS: Benefits

Converged OSS/BSS applications will provide a series of benefits similar to the ones obtained by the IMS within the network but related to the overall company operational activities external to the network:

- **Short time reaction** to new services introduction
- **Labor force reduction** for the operation
- **Common look & feel** for the support services with easier training
- **New facilities** for agile reaction to business competitive forces
- **Profitability increase** due to advance in the revenues and decrease of Opex
- **Quick reaction** to contract updates, customer care and SLA requirements

Network Architecture towards NGN
Summary of Key Evolution Factors

- Plan a **phased approach** for the network migration based on business evaluation per scenario type.

- Implement **pilot cases** before network migration due to the many new technical issues.

- Start at core network segment and OSS/BSS

- Ensure continuity of OSS/BSS functionality in the integration towards an NGSS to increase customer response profitability