ITU / BDT

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Migration from former networks to NGN

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Migration to NGN
Content

- Key factors for the evolution towards NGN
  - Services and revenue motivations.
- Network architecture consolidation at transit, local and access levels
  - Topology and migration
- Network optimization based on planning methods and tools
  - Support to Network Design

Network Architecture - migration to 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 - migration to NGN
Key Factors: Issues to consider

- Ensure service and business continuity for existing customers.
- Introduction of new services based on profitability
- Inter-working with existing PSTN and other operator's networks
- QoS for guaranteed services and critical business customers
- Tariff principles as a function of market demand and consumption of network resources (Backward Cost Assignment)
- Universal Service Obligations for basic services and internet

Network Architecture - migration to NGN
Key Factors: Questions

- When to start network migration ?
  - Short term versus long term versus combined per network segment
- Where to start ?
  - Access versus local versus transit versus applications
- How to perform migration ?
  - Overlay versus substitution versus new sub-networks at growing areas

Network Architecture – migration to NGN
Key Factors: Country Status

- Diversity of Geo-scenarios in customers density and development level: homogeneous versus heterogeneous
- Development level for accessibility, fixed services, mobile services and video
- Aging of installed equipment for Outside Plant, Transmission and Switching
- Competition level for fixed and mobile services
- Regulatory status

Network Architecture – migration to NGN Content

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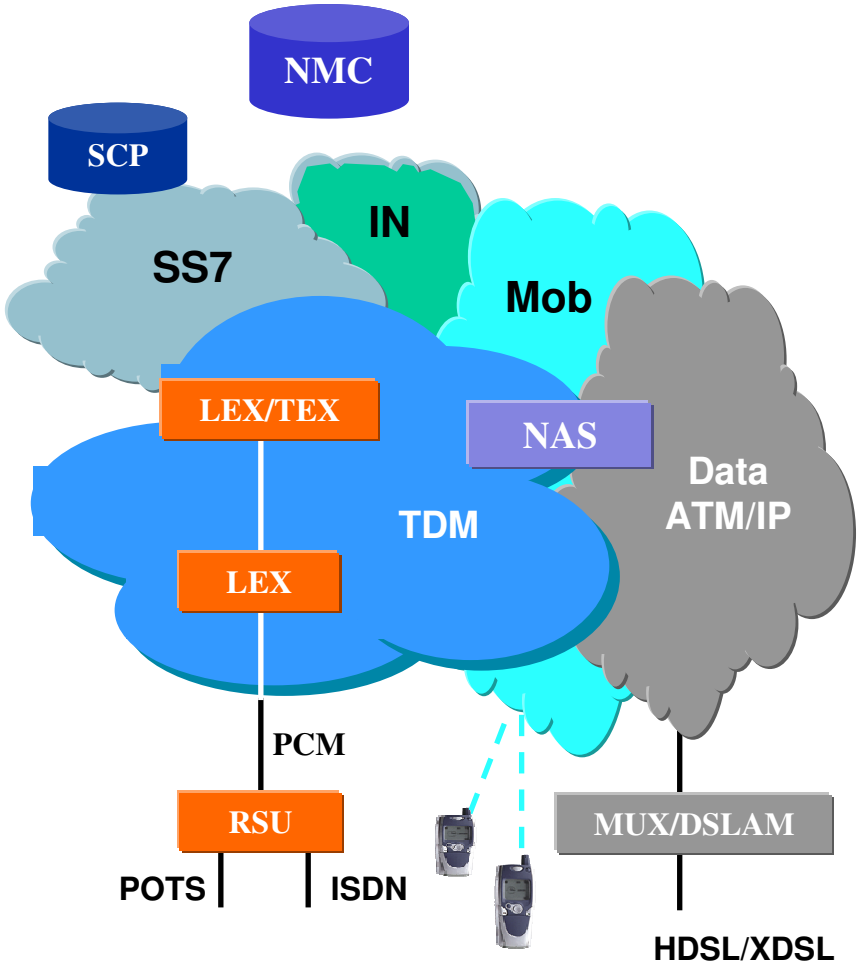
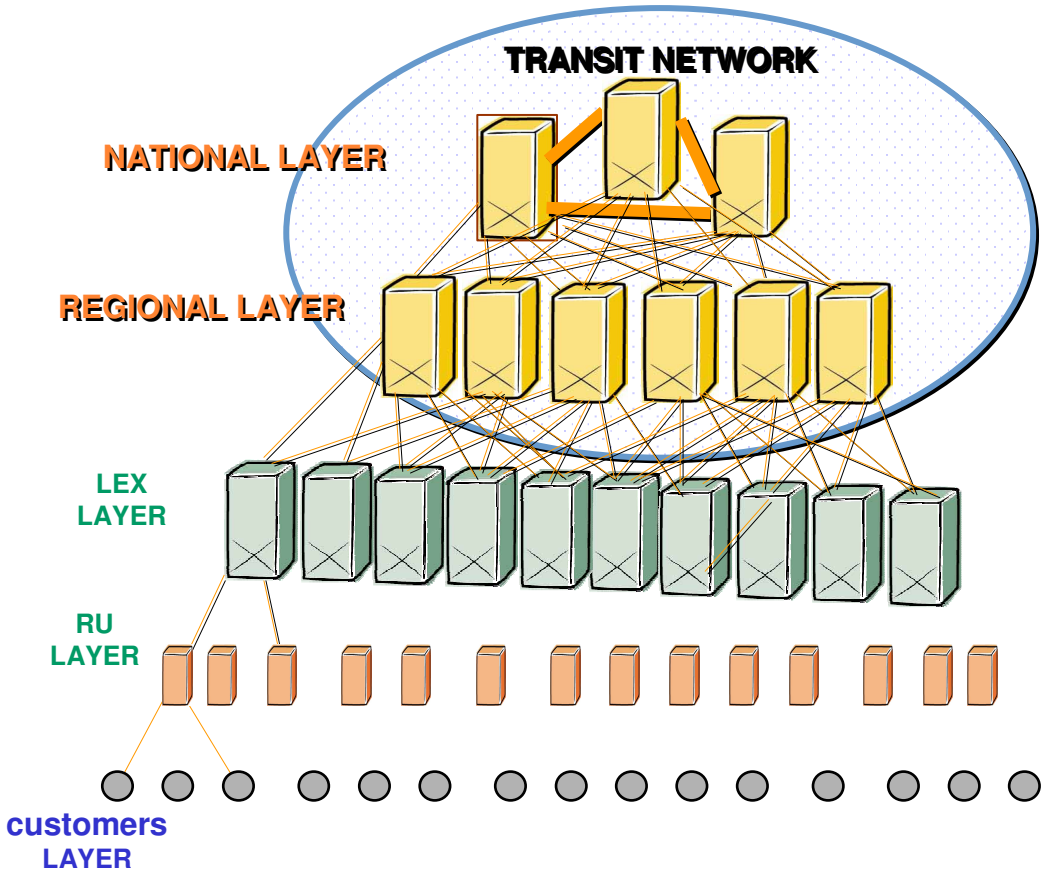
Network Architecture – migration to NGN
Existing networks and architecture



- 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

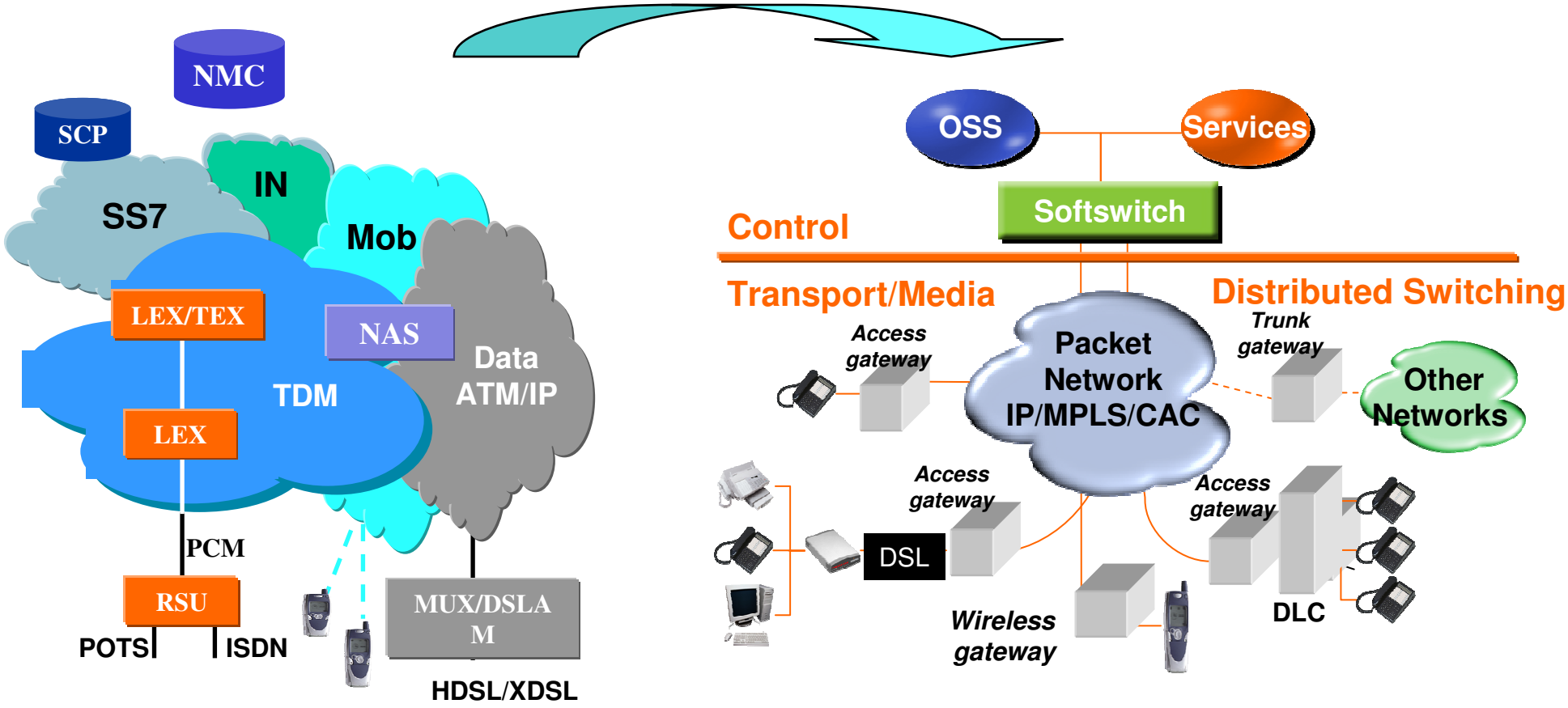
Network Architecture – migration to NGN
Existing networks and architecture



- 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

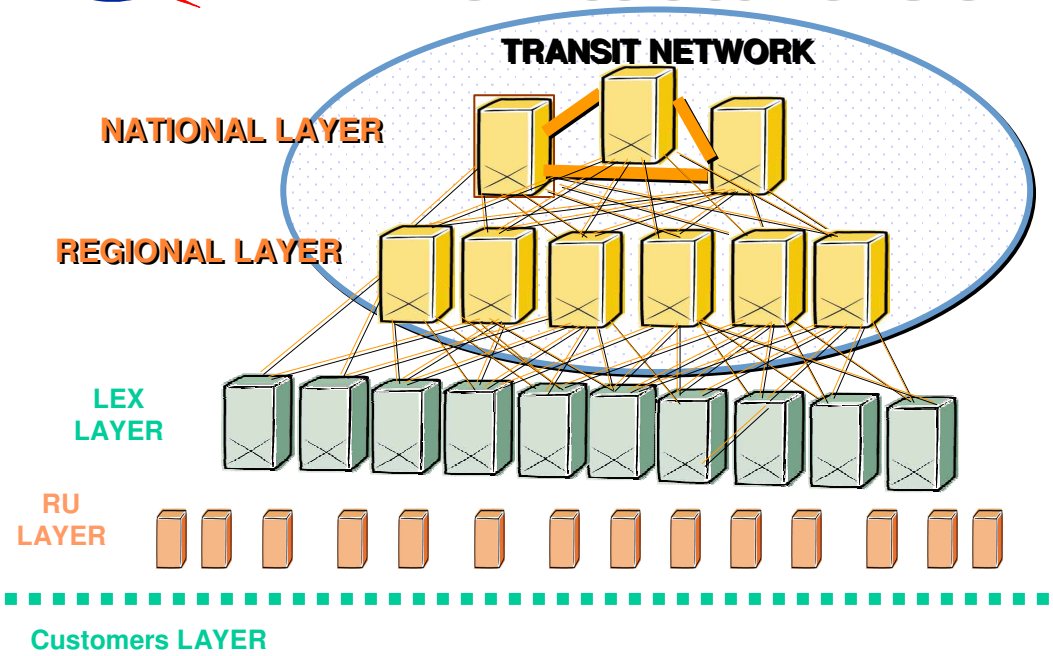
Network Architecture – migration to NGN
Architecture Consolidation: Topology

What changes from current scenario towards target network ?

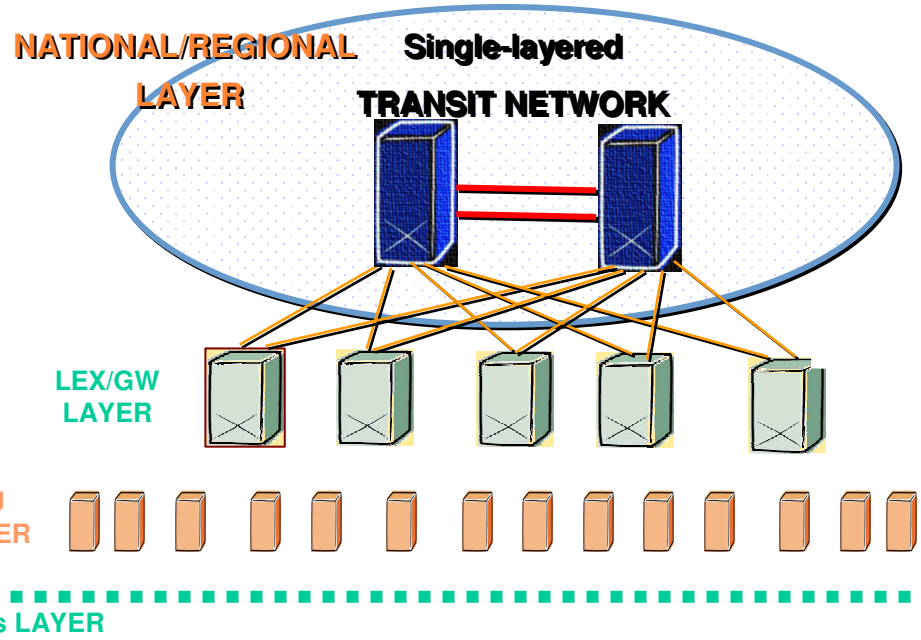


Network Architecture – Migration to NGN

Architecture Consolidation: Topology



Structure Simplification



Network Architecture – migration to 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

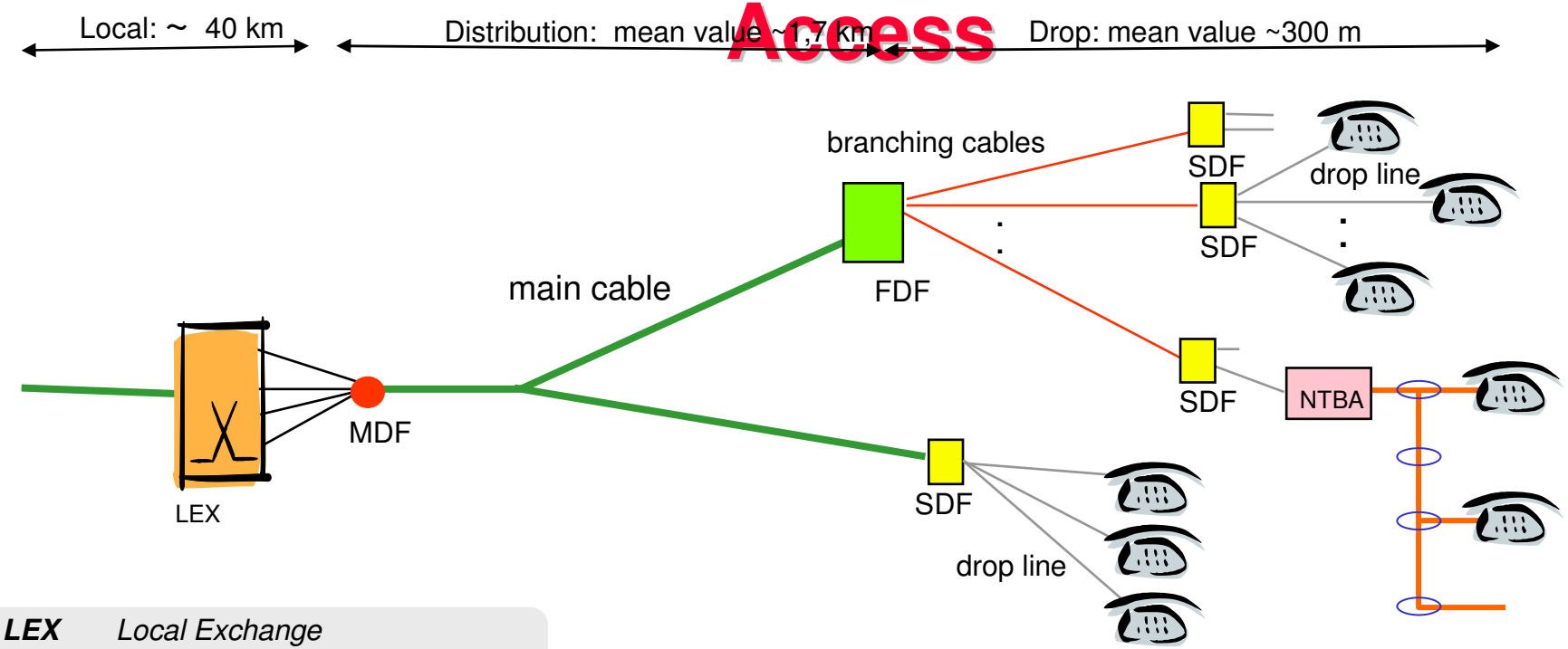
- New Wireless technologies for low density customer scenarios

- Shorter LL length than classical network to be prepared for high bandwidth Multimedia services

Network Architecture – migration to NGN

Architecture Consolidation: Wireline Access

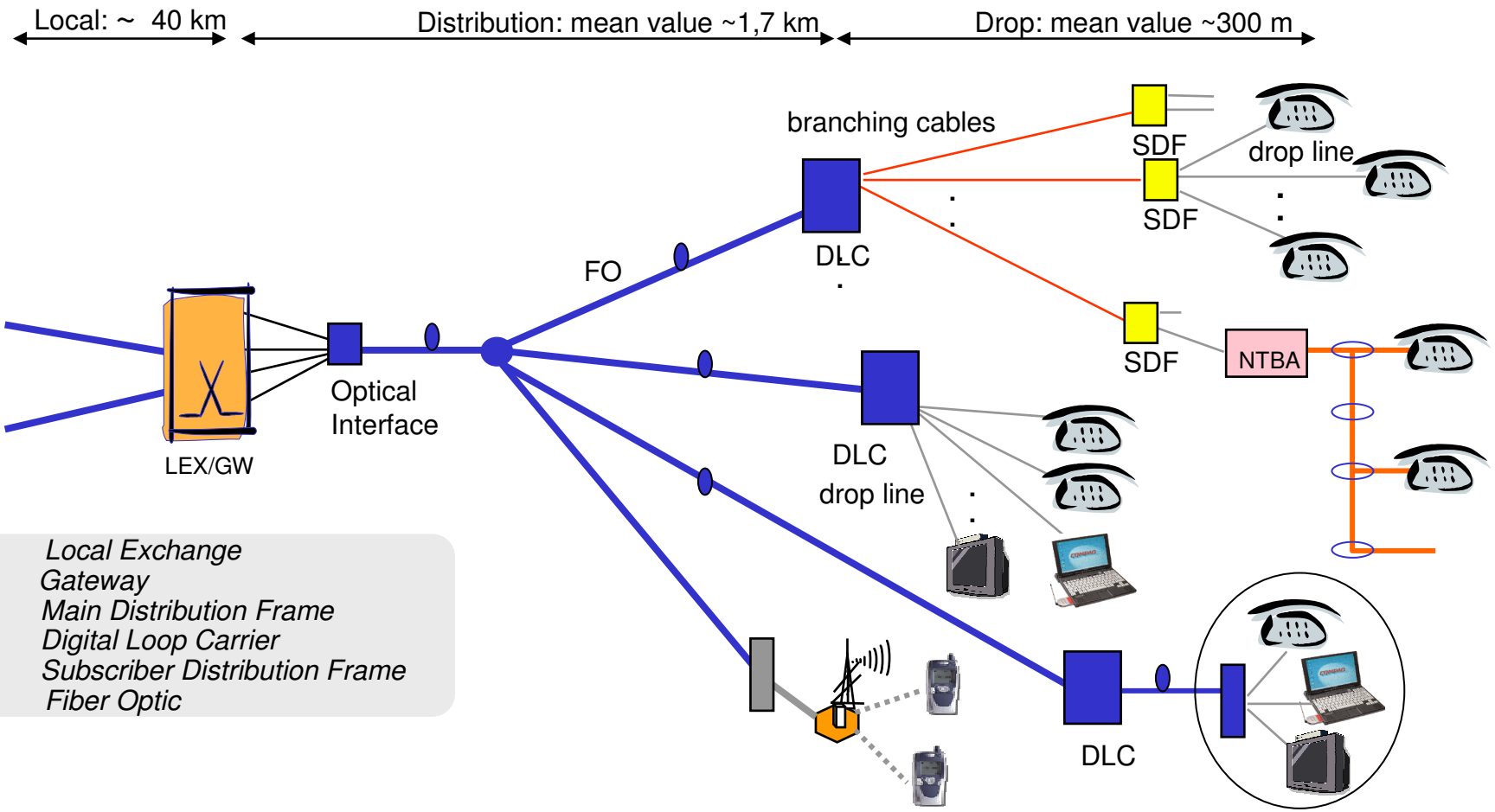
Typical historical Access Network structure



LEX	*Local Exchange*
MDF	*Main Distribution Frame*
FDF	*Feeder Distribution Frame*
SDF	*Subscriber Distribution Frame*

Network Architecture – migration to NGN
Architecture Consolidation: Access evolution

Typical Access Network evolution



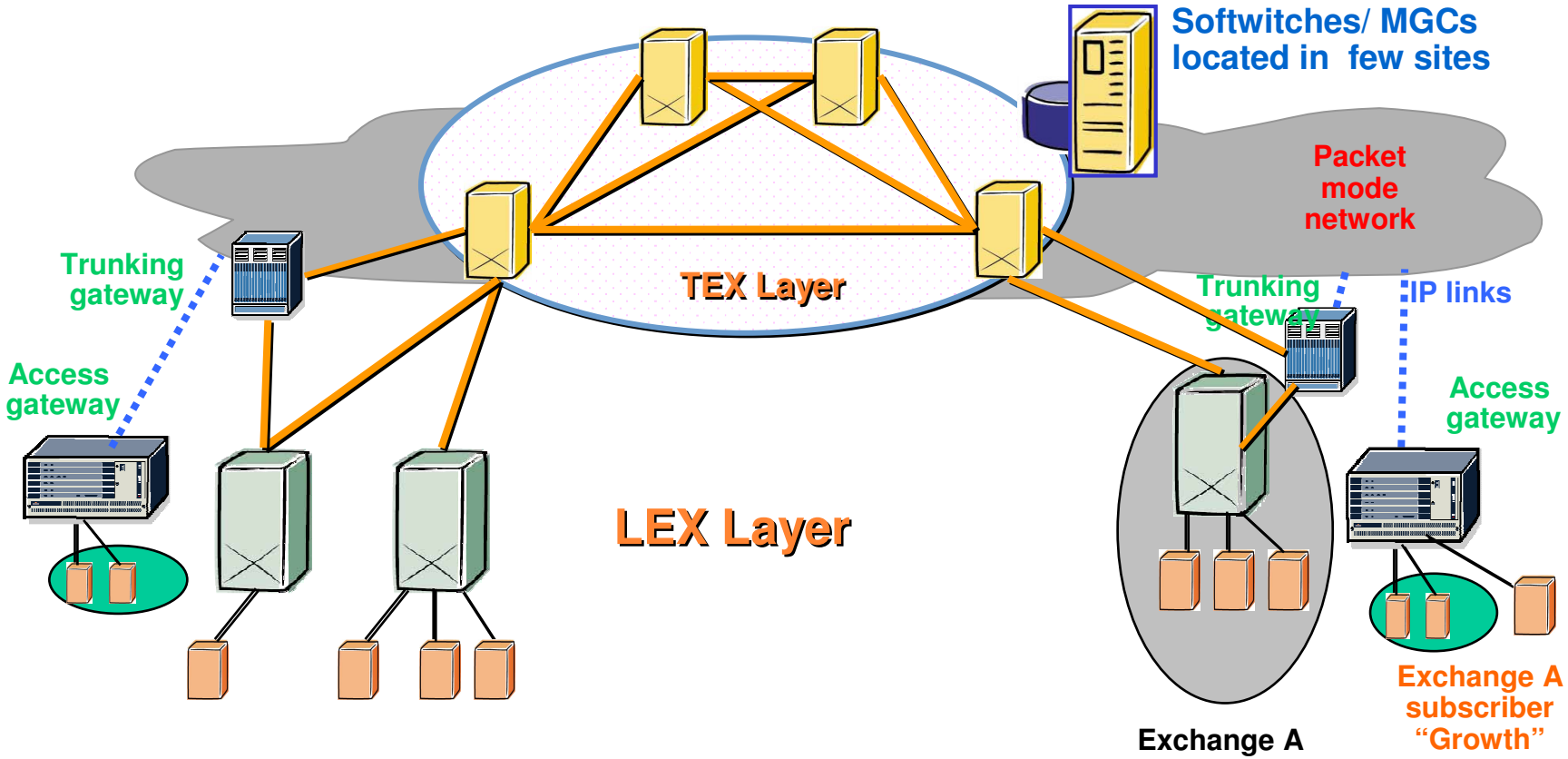
LEX	*Local Exchange*
GW	*Gateway*
MDF	*Main Distribution Frame*
DLC	*Digital Loop Carrier*
SDF	*Subscriber Distribution Frame*
FO	*Fiber Optic*

Network Architecture – migration to 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 – migration to NGN
Architecture Consolidation: Local



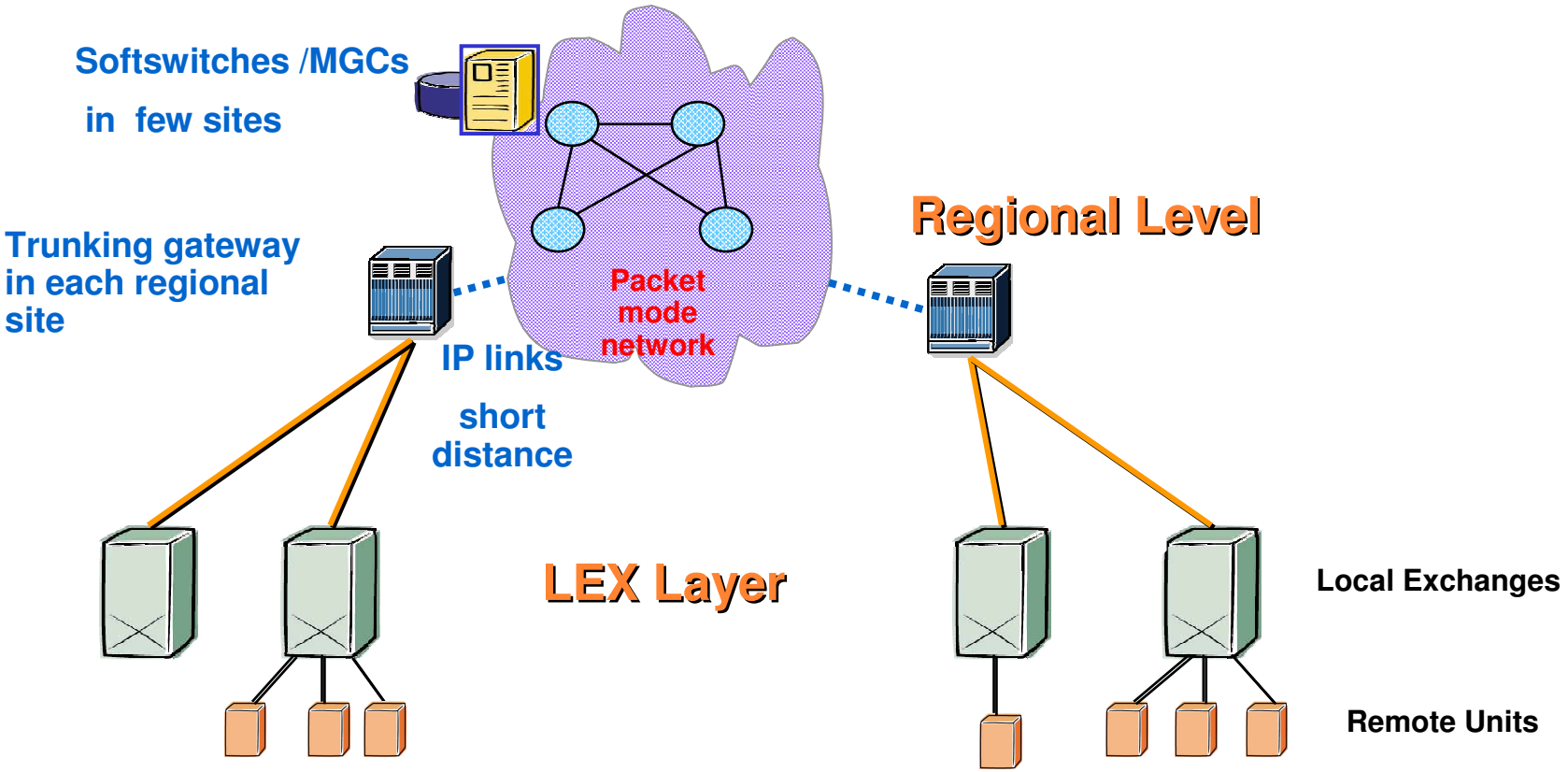
Network Architecture – migration to NGN
Architecture Consolidation: Core

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, diversity paths and survivability
- Importance of the optimization for location and interconnection

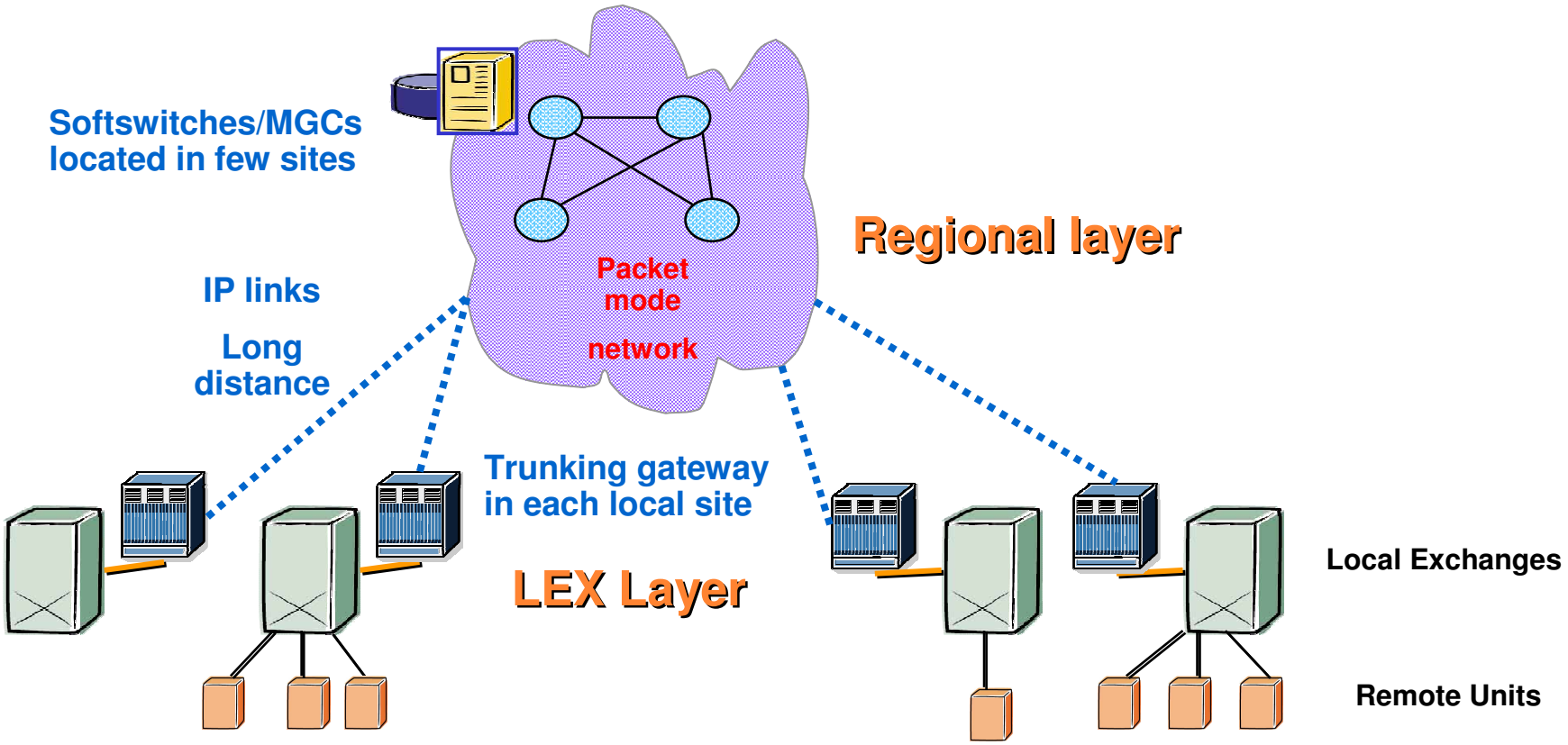
Network Architecture – migration to NGN

Architecture Consolidation: Core



Network Architecture – migration to NGN

Architecture Consolidation: Core



Network Architecture – migration to NGN
Architecture Consolidation: Combined Segments

Where to start and how to co-ordinate migration?

Network "consolidation"

Cost Optimization 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 – migration to 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

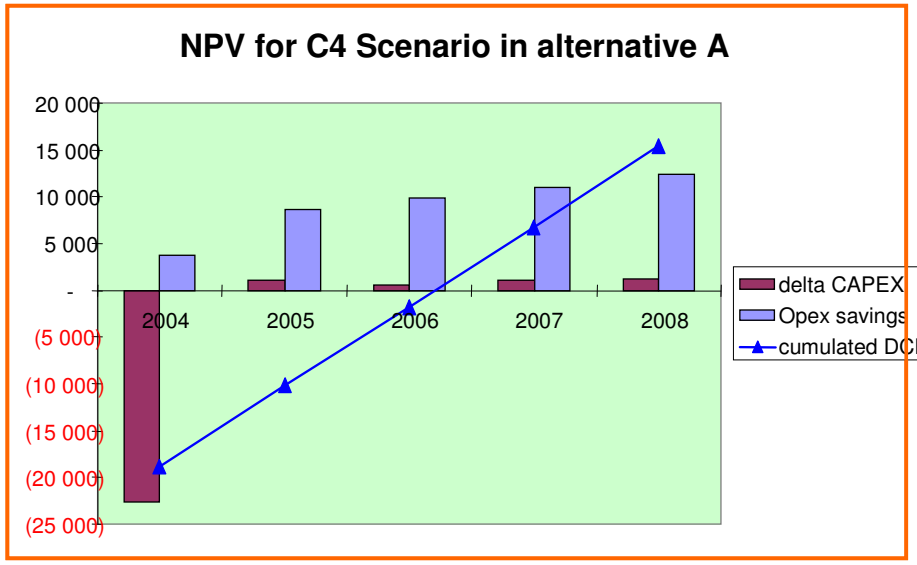
OPEX

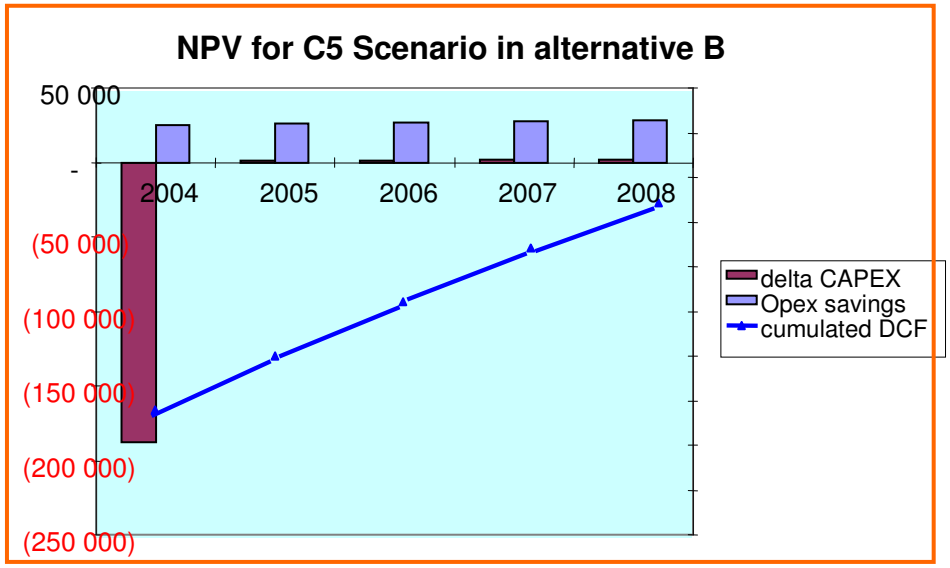
- OPEX in NGN trends to be lower
- Migration scenarios will have a mix of TDM OPEX (installed base) and NGN OPEX (substitution and growth)
- Significant impact of manpower cost due to convergence in operations

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

Network Architecture – migration to NGN Architecture Consolidation: Scenario evaluation

- **Net Present Value (NPV)** for the overall migration project is the best global evaluator





A large variety of country scenarios and transition strategies generate major differences in the economical results ⇒ Planning to be performed per country and operator

Network Architecture – migration to NGN Content

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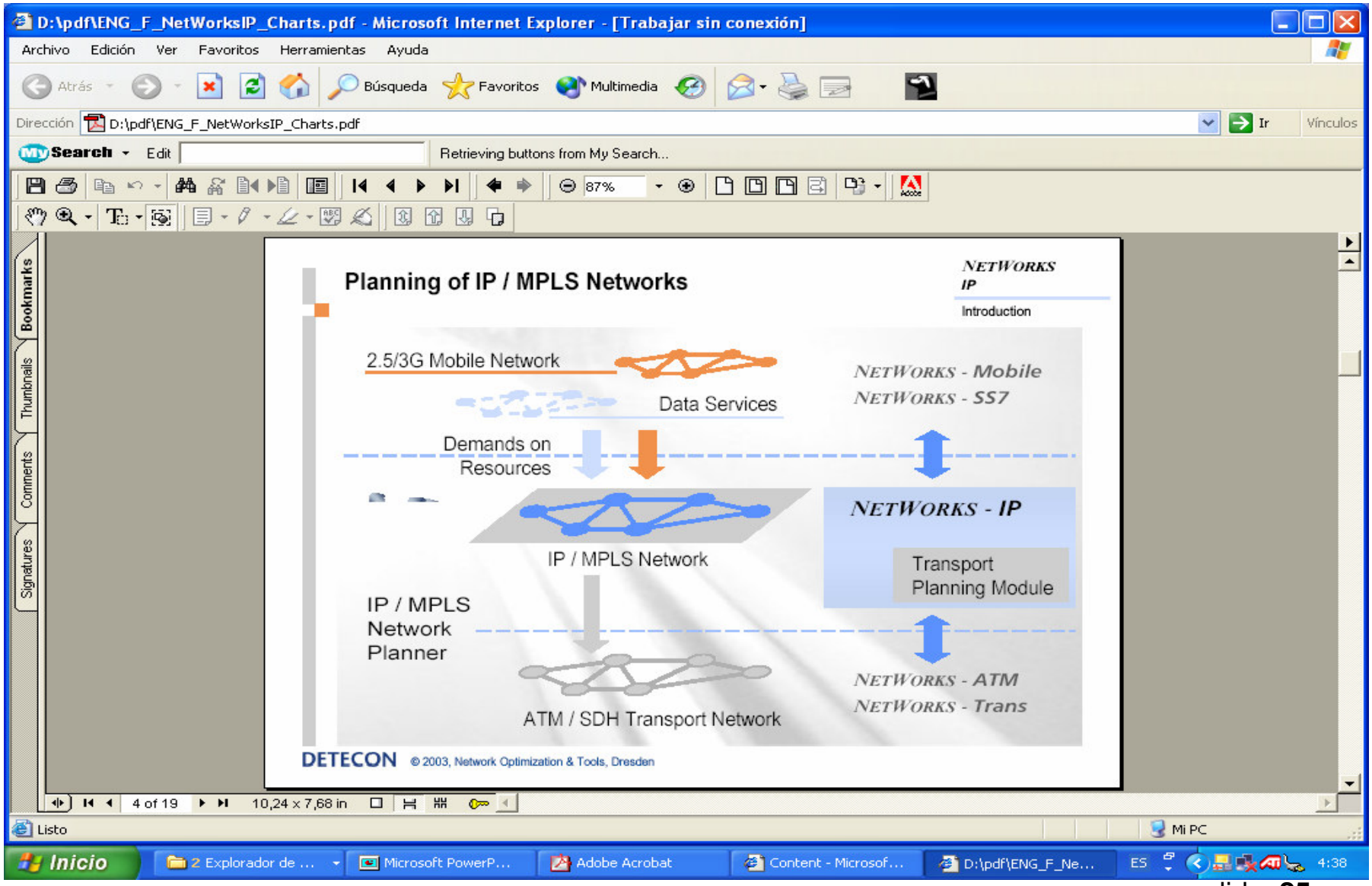
NGN
Support tools: Design and Optimization

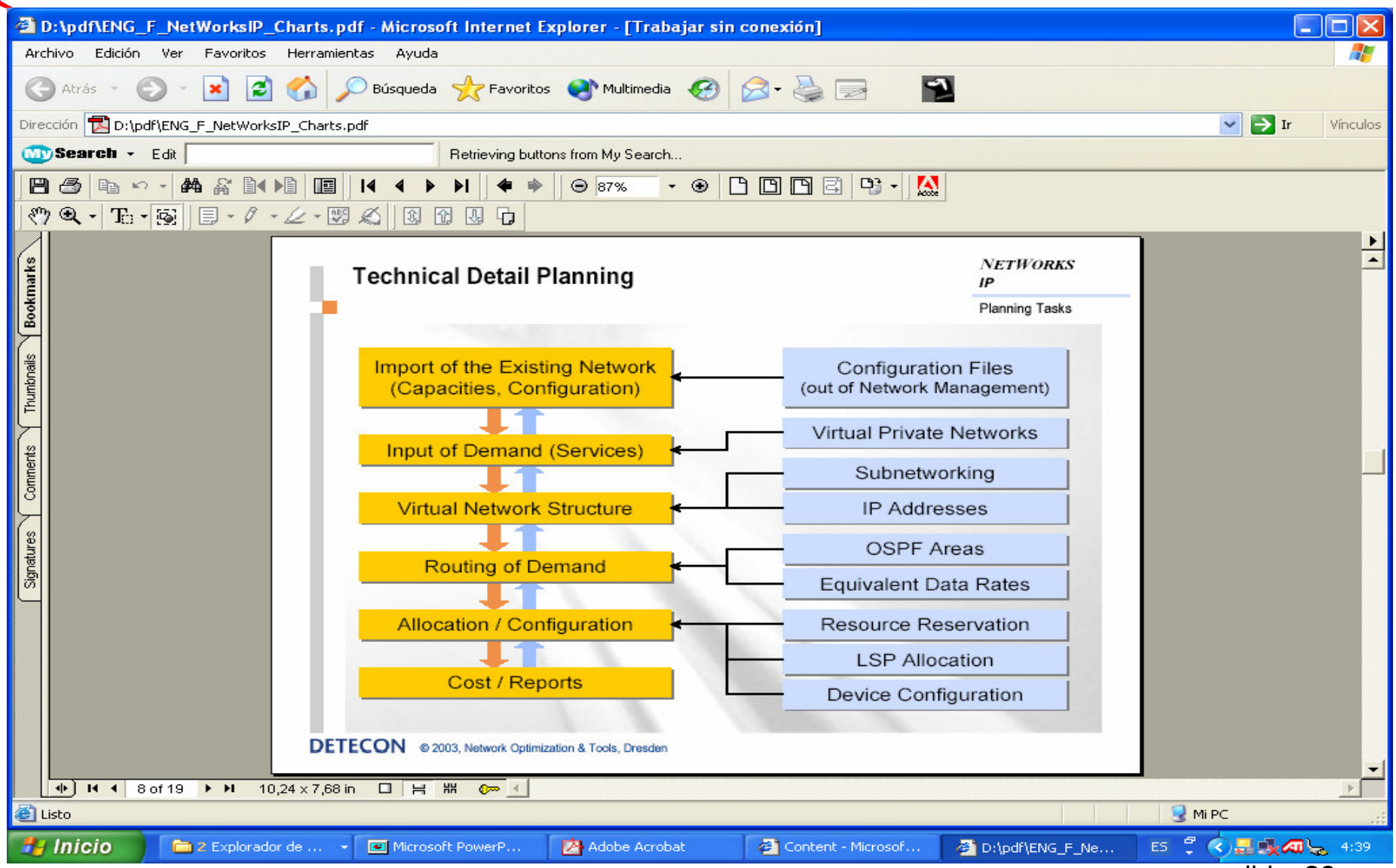
Required functionality for Technical design tools

- Service demands characterisation and traffics for VoIP and NGN multiservice flows
- Conceptual Network Design and Capacity Planning
- Comparison of different network structures
- Routing flows for most typical cases including OSPF, shortest path, widest path and weighted cost functions.
- Optimizing locations and connections of network gateways
- Cost, Performance and Reliability Analysis
- Estimation of investment costs for the rollout and the extension of the investigated multi-service network
- Estimation of end-to-end delays
- Technical Site and System Planning
- Allocation of the IP or MPLS links
- Formation of virtual networks
- Routing over ATM links or PDH/SDH systems or tunneling via other IP links
- Sub-networking and addressing

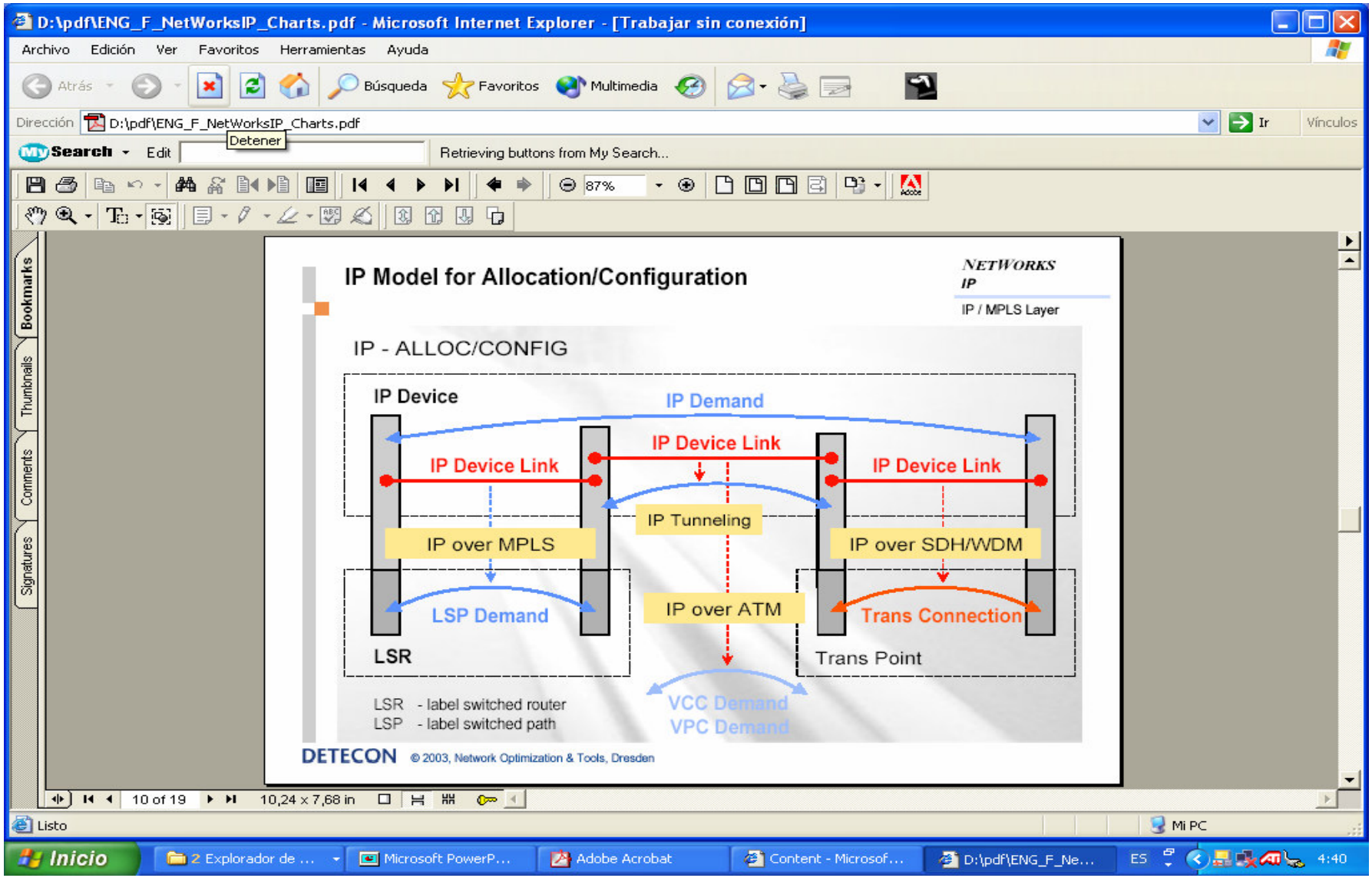
Network Architecture – migration to NGN
Support tools: Design and Optimization



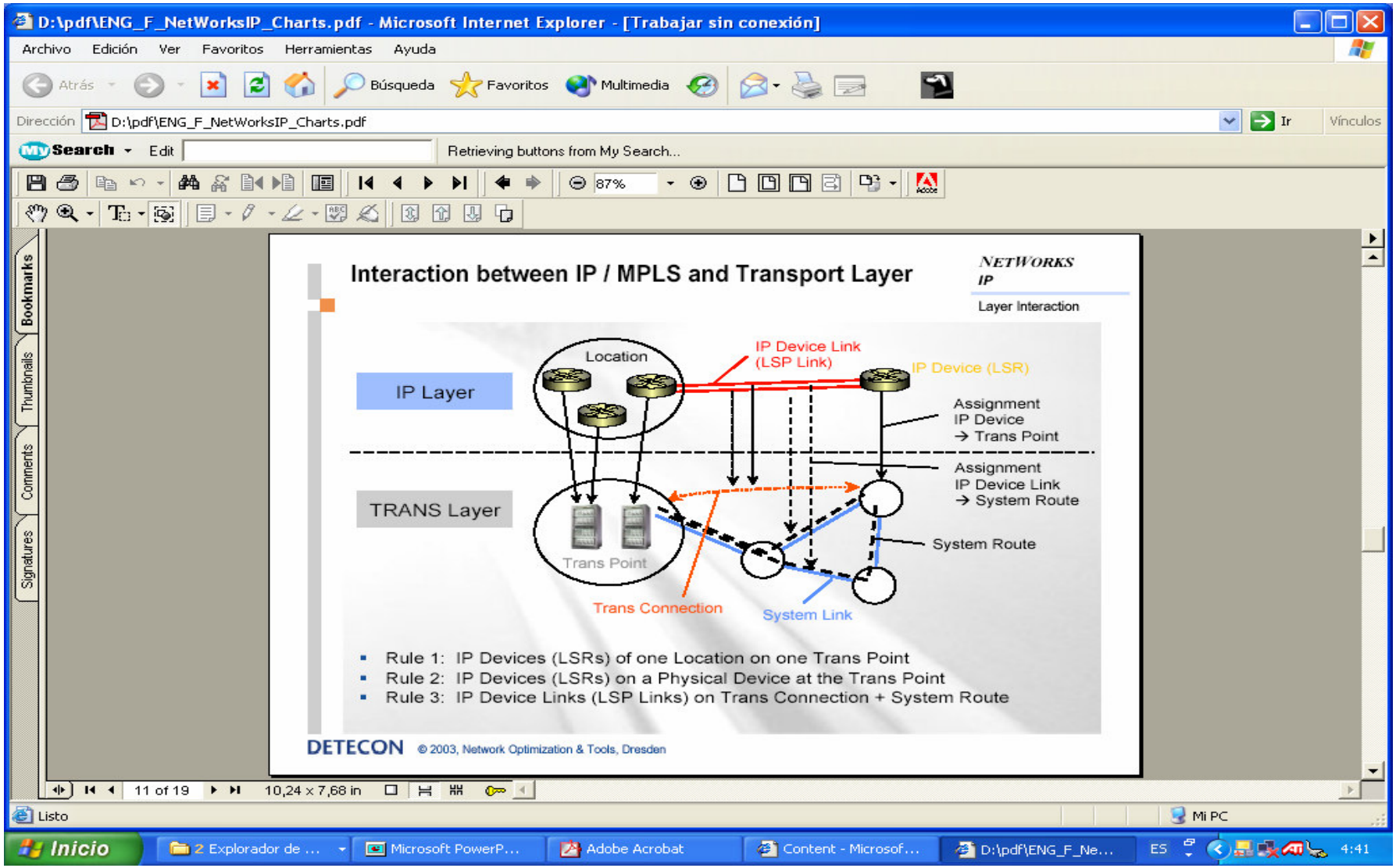
Network Architecture – migration to NGN
Support tools: Design and Optimization



Network Architecture – migration to NGN
Support tools: Design and Optimization

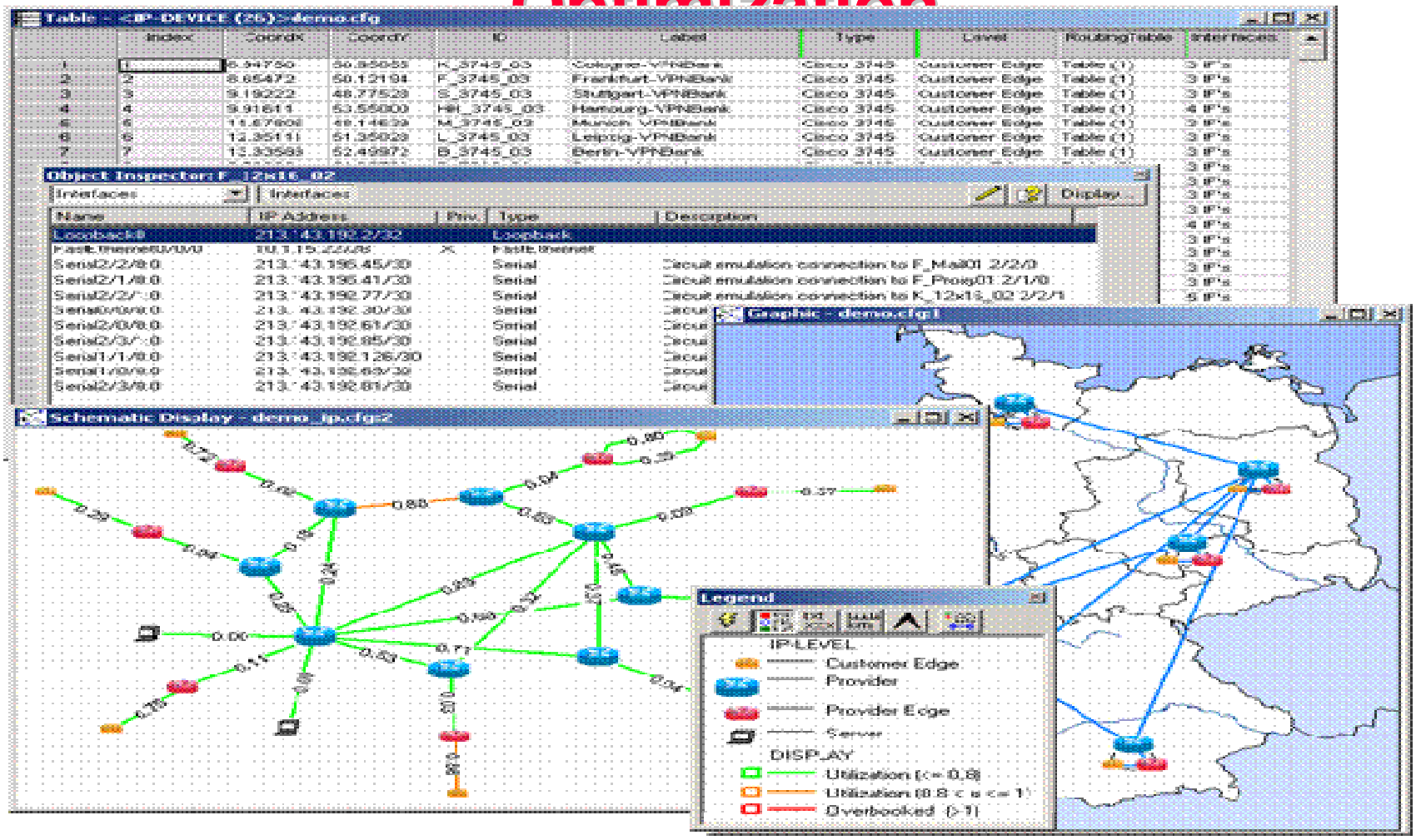


Network Architecture – migration to NGN
Support tools: Design and Optimization



Network Architecture – Migration to NGN

Support tools: Design and Optimization



Network Architecture – migration to NGN
Summary of Evolution Factors

- Ensure service **continuity**

- Plan **business and services first**, later the network with proven solutions.

- Implement **pilot cases** before network migration

- **Differentiation** to competitors on new services and quality