SCENARIOS FOR TRANSITION FROM CIRCUIT SWITCHED TO PACKET SWITCHED NETWORKS

Nina Parvanova

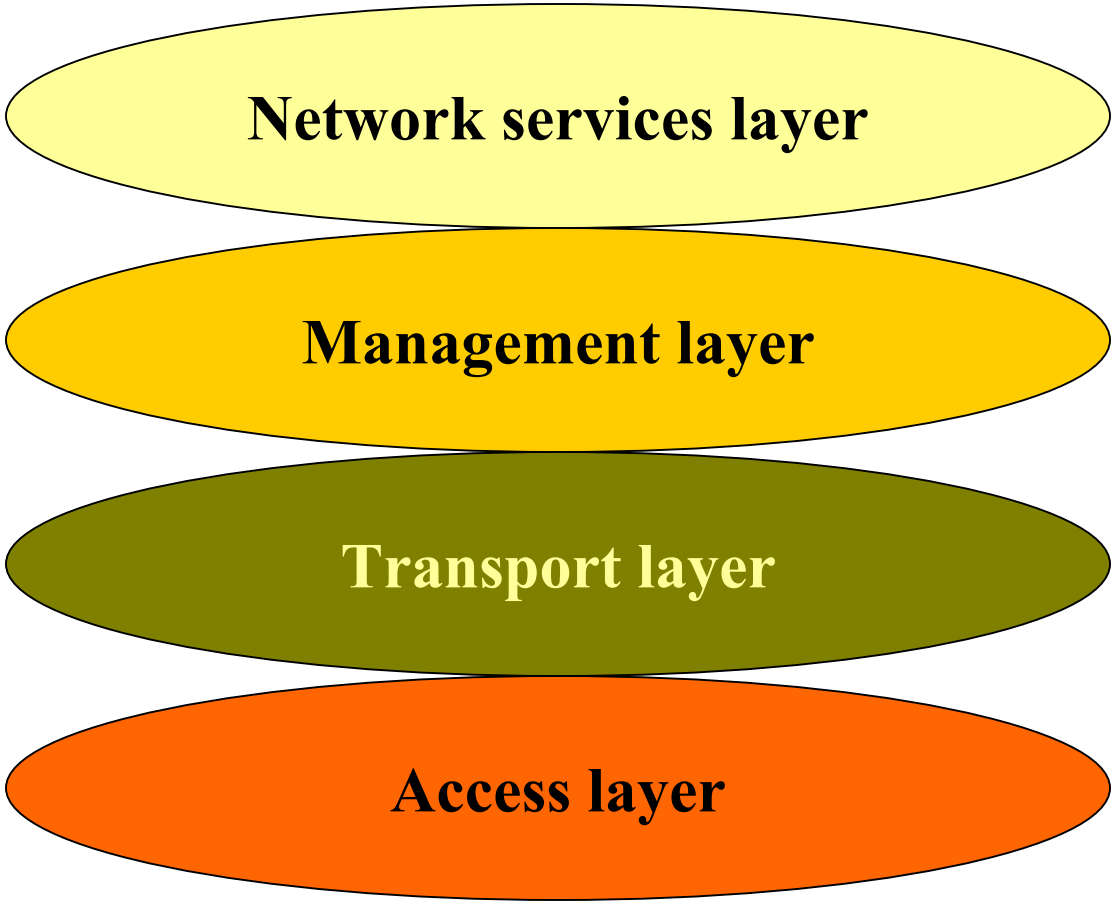
BTC, ISRT

- **Trends for Development of the Telecommunications Networks - NGN**
- **Legacy Networks**
- **Possible Transition scenarios toward NGN**
- **Appropriate scenario for BTC Network short term Development**

Trends for Development of the Telecommunications Networks - NGN

- NGN - common packet based architecture for voice, data and video transmission;
- Common multiservice broadband access;
- Open (Distributed) Network Management Architecture;
- New and advanced services: Intelligent Network (IN) Open application interfaces, Application Program Interfaces (APIs);

NGN Architecture



Major NGN advantages

- Common packet based technology- common access and transport network
- Standardised network elements, used for all applications and services
- Easy and fast creation and deployment of new services and applications
- Vendor independence - the open interfaces allow the best equipment to be chosen for each layer
- Flexible dimensioning, eliminating the necessity to fix bandwidth for voice trunks, due to the common packet based transport
- Powerful equipment for network control and management - easier and more effective SW upgrade; web-based technologies for network and services management, including management from the customer site.
- Reduced CAPEX and OPEX, better ROI

Legacy Networks

- Different networks for each basic service - voice, data, video
- Data networks - the major share of the handled traffic volume is IP based, neverthless the transport technology
- PSTN/ISDN - voice traffic still prevails, but the dial up Internet traffic volume increases steady
- Main telephone lines served by BTC - 3 000 000
- Relatively high telephone density - 40% (90% households penetration rate)
- Low digitalisation degree - 41% (end of 2003)
- Estimated number of residential PCs (as for 2001) - 360 000
- Estimated number of Internet users - 600 000 (as for 2001)
- POTS - still preferred service, limited demand on ISDN and broadband services

PSTN limitations

- PSTN - designed for voice telephony
- The volume of dial up Internet traffic increases, could cause QoS problems for the basic voice services
- Introduction of unified services and sophisticated applications is impossible - does not allow broadband services, high speed data communications

Possible Transition scenarios toward NGN for BTC

- Scenario 1. Network consolidation
- Scenario 2. Deployment of overlay packet based network
- Scenario 3. Technology replacement

Scenario 1. Network consolidation

- **Maximum utilisation of the installed capacities in the TDM switches:**
  - optimal utilisation of the already installed DLEs
  - expansion of their service area
  - replacement of analogue exchanges with subscriber capacities, served by DLEs
  - optimisation of the connectivity on regional level, reducing the number of nodal service areas
- **Limited deployment of multiservice access systems**
  - provision of POTS, ISDN BA, ISDN PA, digital LL (n x 64 k), xDSL (ADSL, SHDSL), served by MSANs and xDSLs by DSLAMs
  - splitting the dial up Internet traffic from the PSTN and routing it to the data network

Scenario 1. Network consolidation

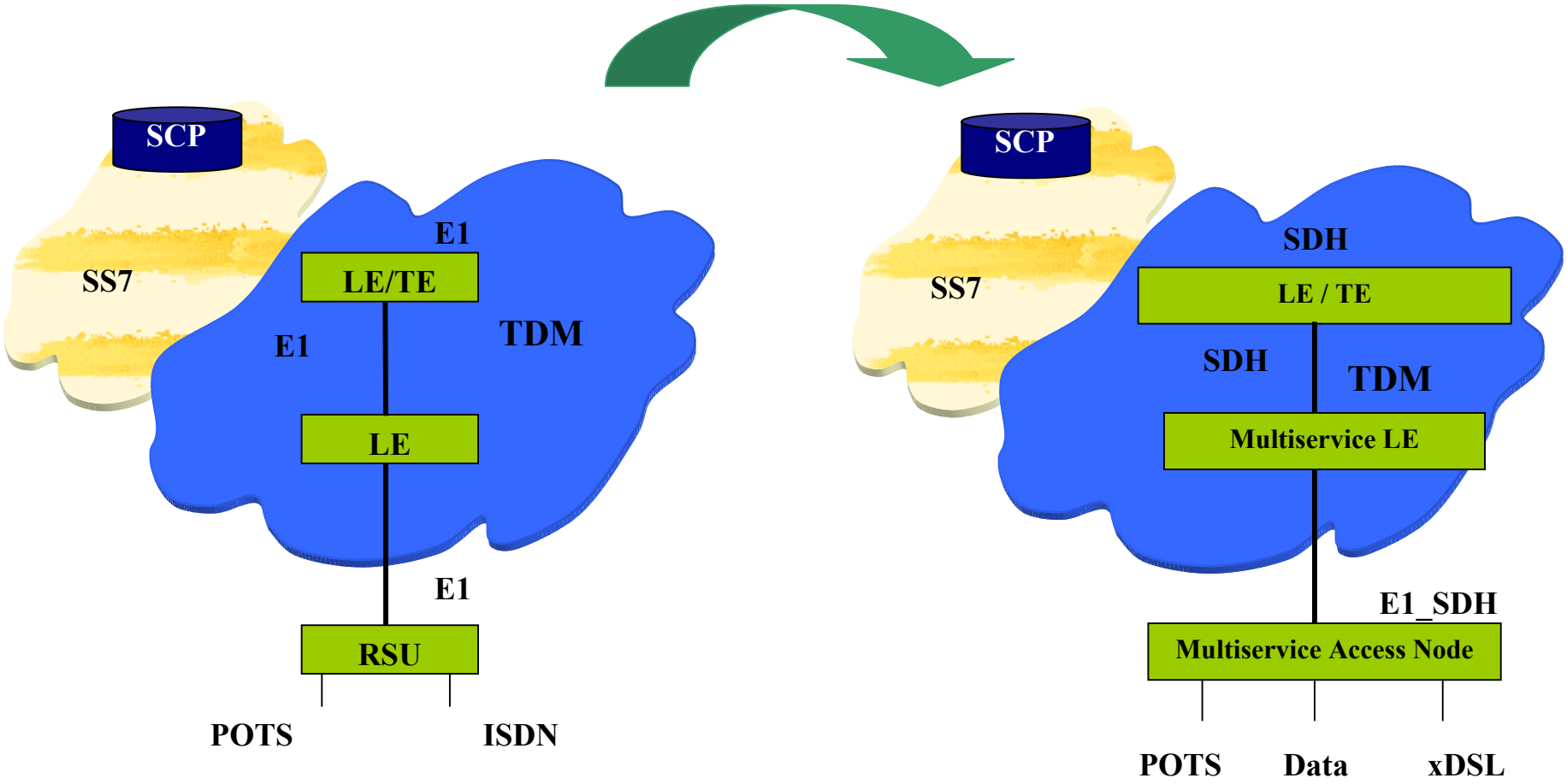
Major Advantages

- Optimal utilisation of the existing TDM equipment, thus reducing the analogue part of the network, network infrastructure optimisation.
- Significant CAPEX and OPEX reducement, due to the expansion of existing DLEs, decreasing the number of analogue exchanges in operation.

Major Disadvantages

- IP Network development delay
- Limited number of services to be offered
- Possible PSTN overload, due to the prevailing dial up Internet access and limited deployment of MSANs and DSLAMs

Network consolidation



Scenario 2. Deployment of overlay Packet Based Network

- Ongoing network consolidation (as for scenario 1 - optimal utilisation of the already installed TDM equipment)
- Deployment of IP-based overlay network
- Deployment of Multiservice access systems and DSLAMs for broadband services provision
- Initial (limited) deployment of VoP services for enterprise and business customers

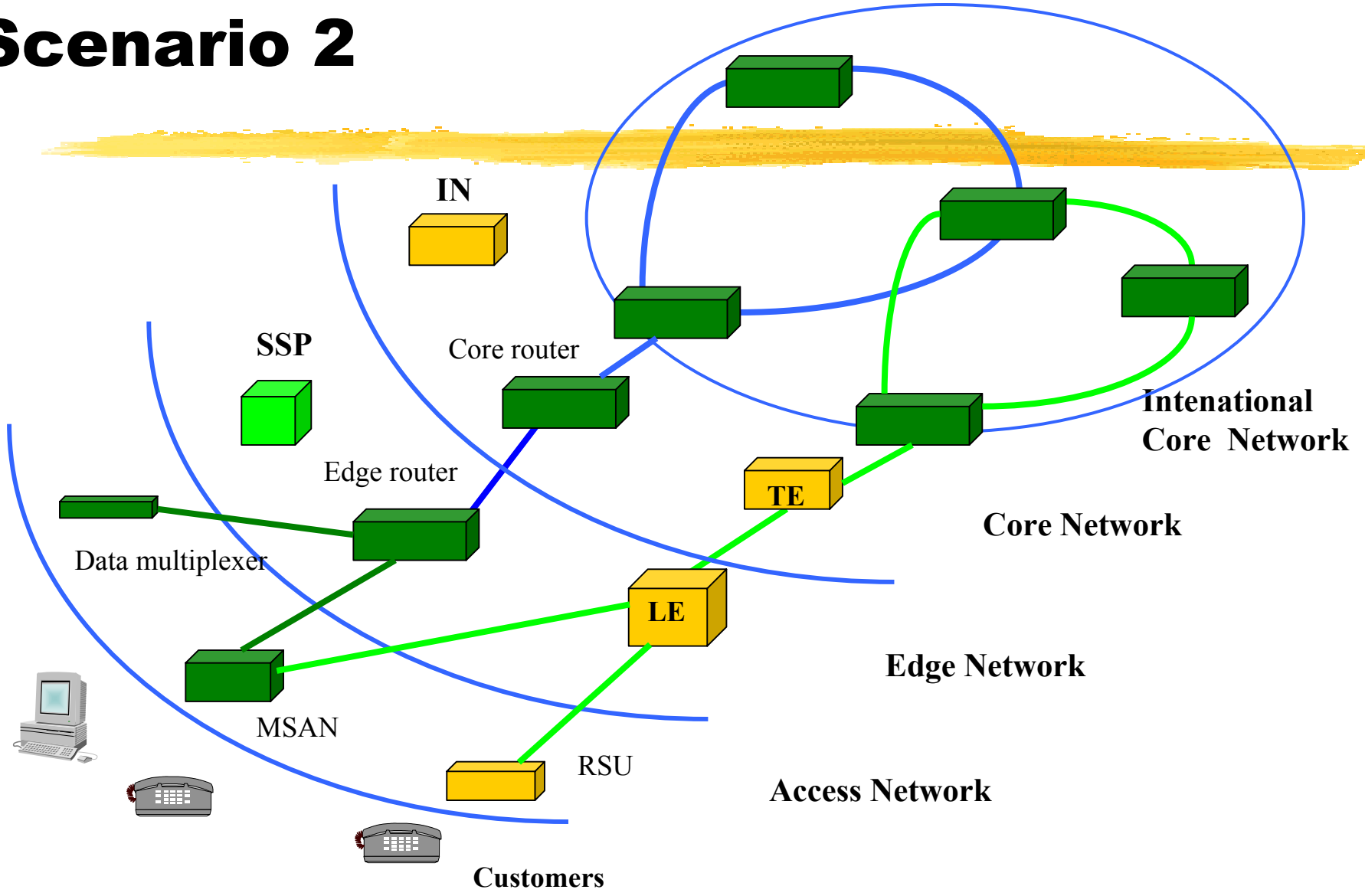
Scenario 2. Deployment of overlay Packet Based Network

- **Major Advantages**
- Optimal utilisation and Capitalisation on the existing TDM equipment
- The IP overlay network, combined with the Multiservice access systems - initial step towards the future common packet based network
- Better services portfolio, especially for business and enterprise customers
- Reduced OPEX in the TDM part of the network
- Future save investments

Scenario 2. Deployment of overlay Packet Based Network

- **Major Disadvantages**
- Increased CAPEX
- Increased OPEX

Scenario 2


IN
SSP
Core router
Edge router
Data multiplexer
TE
LE
MSAN
RSU
Intenational
Core Network
Core Network
Edge Network
Access Network
Customers

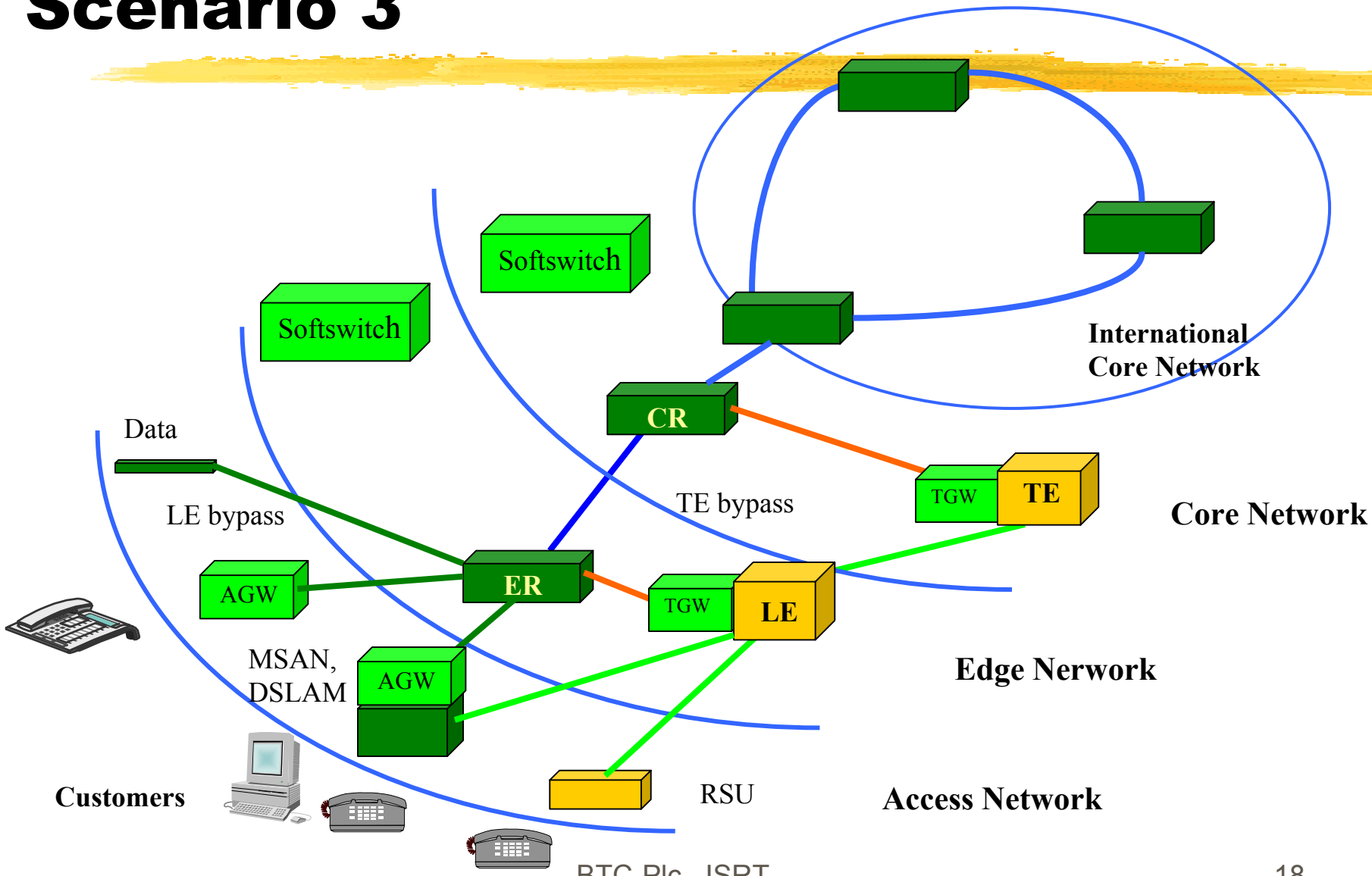
Scenario 3. Replacement of legacy TDM equipment

- **Start point of:**
  - Replacement of the existing PSTN equipment with packet based one
  - Building up a common packet based network for voice, data and video
  - Accelerated deployment of multiservice access systems
  - Offering voice services via softswitch with local exchange functionality

Scenario 3. Replacement of legacy TDM equipment

- **Major advantages**
  - Deployment of an unified packet based network for voice, data and video
  - Investments are in a prospective technology
  - Rich services portfolio, including multimedia services
- **Major disadvantages**
  - Part of the NGN equipment is still under research and development,
  - IP based equipment is deployed mainly in enterprise networks
  - major concerns about QoS
  - CPEs require significant investments, if mass deployed

Scenario 3


Softswitch
Softswitch
International
Core Network
CR
Data
LE bypass
TE bypass
TGW
TE
Core Network
AGW
ER
TGW
LE
MSAN,
DSLAM
AGW
Edge Nerwork
Customers
RSU
Access Network

Appropriate Scenario for BTC Network short term Development

- **The choice of scenario for network development depends on:**
- Existing infrastructure
  - The major part of the existing analogue exchanges are based on Step by Step technology (1929)
  - The installed TDM switches have capacity, which exceeds the forecasted demands
  - Extension of the TDM switches is accomplished only by adding new subscriber modules, thus reducing the CAPEX and OPEX

Appropriate scenario for BTC Network short term Development (2)

- Demand on services
  - The demand on voice telephony and dial up Internet access still prevails on the Bulgarian telecommunications market
  - Limited demand on broadband services
- Overall economics situation in the country
- Investment capabilities
- Telecommunications market liberalisation
- BTC strategic goals
- Experience of other European incumbent operators

Appropriate Scenario for BTC Network short term Development (3)

- **Major NGN issues:**
  - NGN solutions are not mature enough - major concerns about QoS, reliability in case of traffic volumes, similar to those served by the PSTN
  - Not proven economic benefits
  - Lack of standards - interoperability between different vendors' equipment under question mark
  - Difficult integration between NGN equipment and the existing PSTN infrastructure
  - Experience of the European incumbent operators - smooth transition toward NGN

Appropriate Scenario for BTC Network short term Development (4)

- The analysis of the PSTN development, customer demands, standards and international incumbent operators experience, as well NGN element development are the basis for choosing Scenario 2 - **Deployment of overlay Packet Based Network** for short term development of BTC network
- **The Deployment of an Overlay Packet Based Network** is:
  - Low risk scenario
  - The network consolidation allows to capitalise on the existing PSTN equipment, reducing the OPEX
  - IP based overlay network - initial step toward NGN
  - Important customers are provided with broad range of services, based on xDSL and IP technologies
  - Future proven technology deployment.

Thank you !