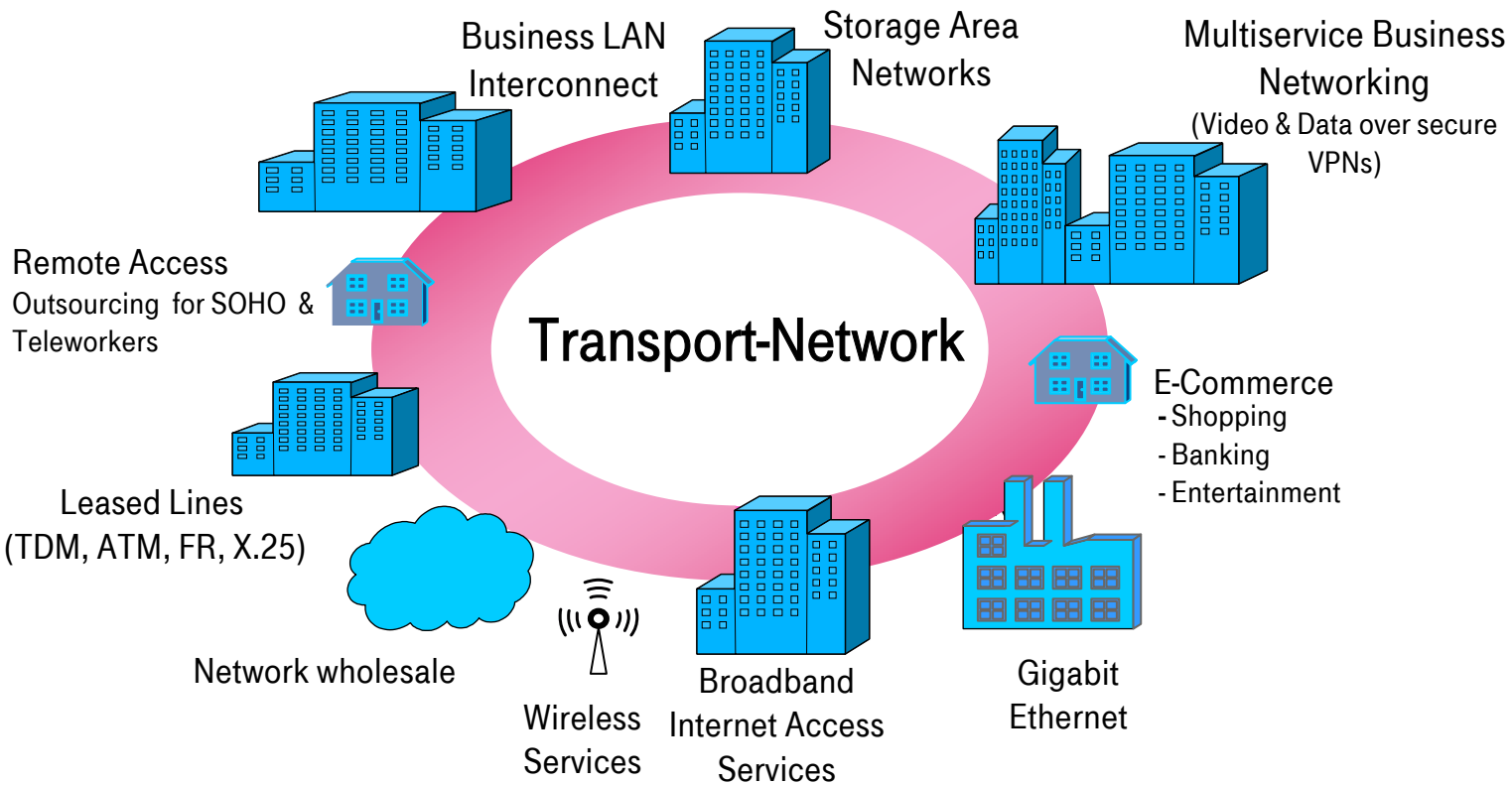
T-Com Headquarters
Technology Engineering

Development and Provisioning of Ethernet Network Technology in the MAN/WAN of T-Com

Contents

Increased demand for a wide range of services places additional requirements on the existing transport platforms



Movement from circuit-oriented to packet-oriented networks based on Ethernet

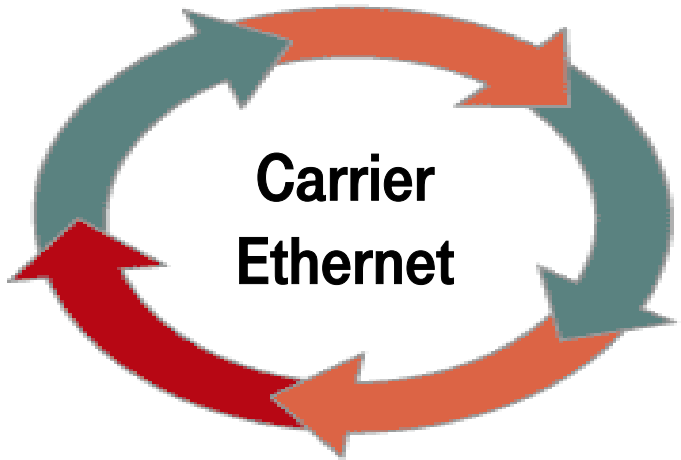
Requirements for “Carrier Class” Ethernet

Network-Provider

- MAN/WAN-wide Services
- Address Space
- Protection mechanisms
- Operations Administration & Maintenance (OAM)
- Fault, Configuration, Accounting, Performance and Security (FCAPS)

Customer

- End-to-End service level agreements
- Assurance
- Class of Service



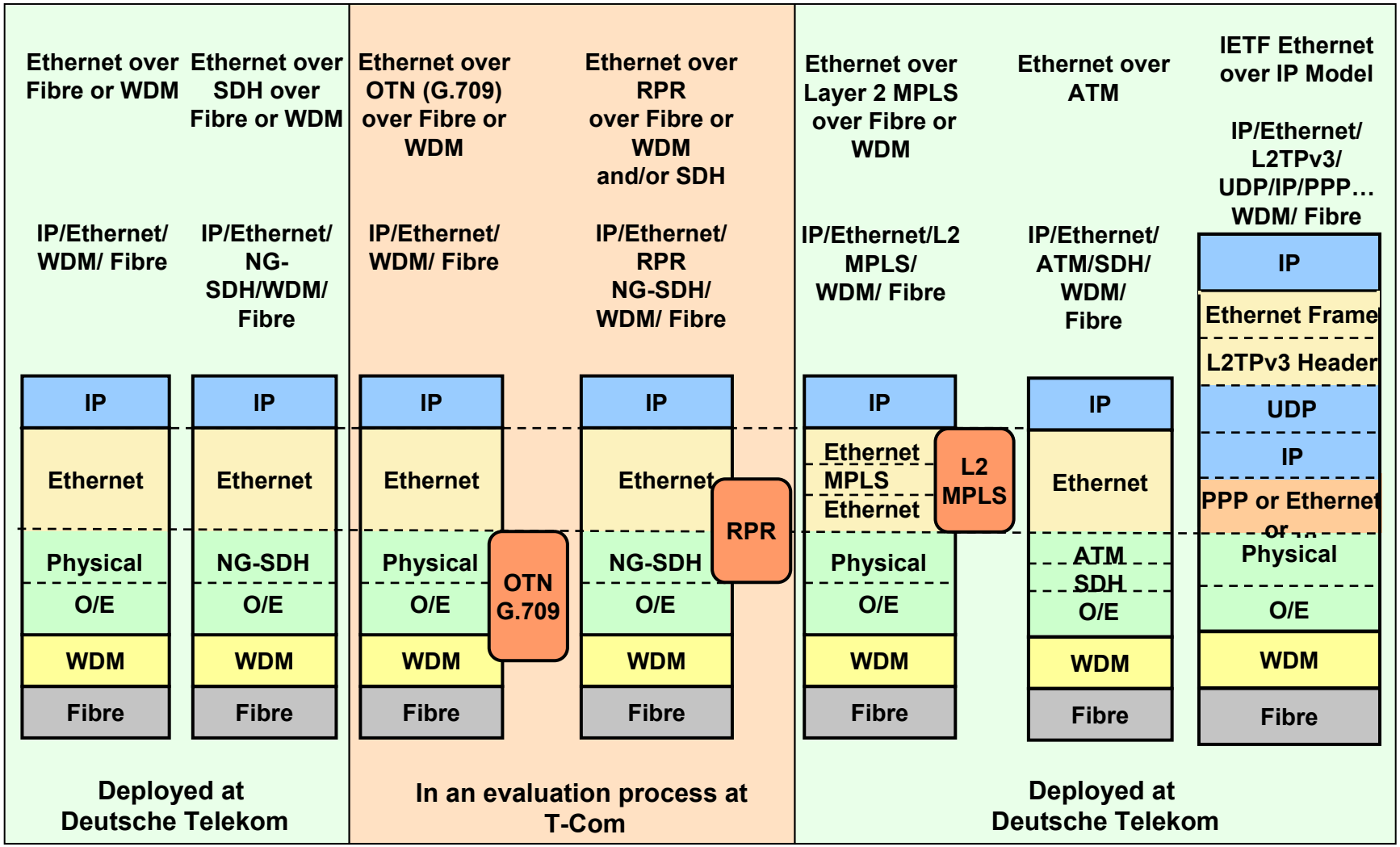
- Traffic Segregation
- Customer Service separation

- Traffic engineering
- Shared bandwidth
- End-to-End service provisioning
- Interworking

- Service bundles
- Service Level Agreements
- Standardized Services
- Low Cost/Capex
- Fast Return on Invest (ROI)

- Ethernet Services (EPL, EVPL, EVPL, EVPLAN)
- Bandwidth Granularity

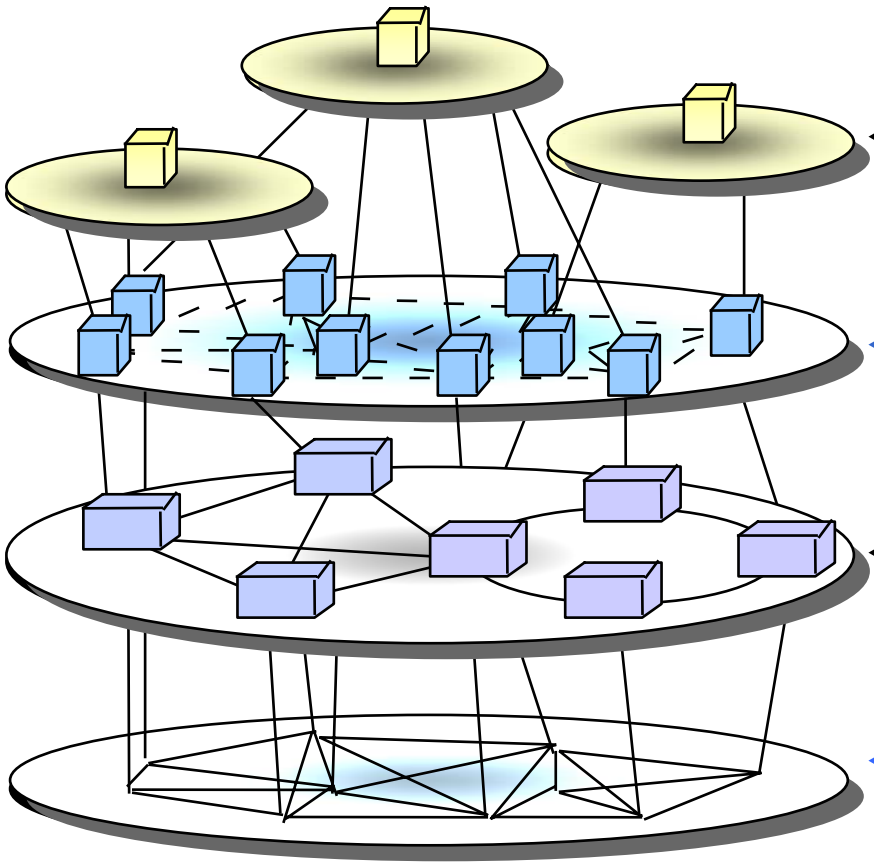
Ethernet Layered Network Architecture for MAN/WAN



Ethernet Services (Standard Form Products) at Deutsche Telekom

Ethernet Services	Bandwidth	Connection	Technology	Launched
EthernetConnect	2 Mbit/s – 10 Gbit/s	Copper, fibre, national, P-t-P, P-t-MPt Connections	Ethernet over SDH	2004
Inter Business Link	Maximum 2 Mbit/s	Copper, international, Point-to-Point Connections	Ethernet over TDM/SDH	2003
IP Transit	100 Mbit/s, 1Gbit/s	Copper, fibre, national/ international Point-to-Point Connections	IP / MPLS	2003

Transport Network Topology at T-Com



„Service“-
platforms:
e.g. ATM, IP, ...

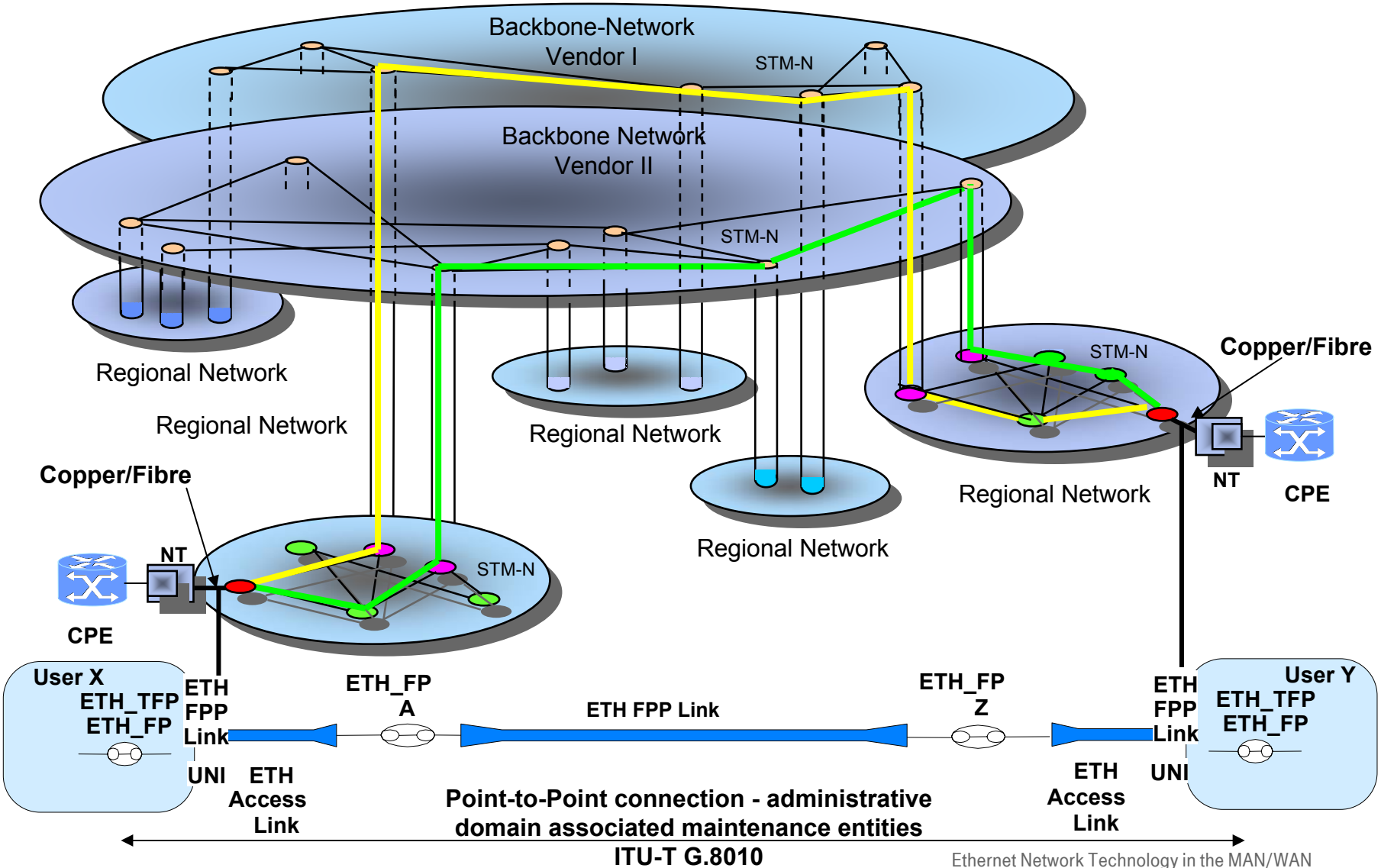
SDH -
Network

Optical network
(WDM)

„Fiber“-network

Metro-WDM,
Metro-Ethernet
for customer
network
solutions

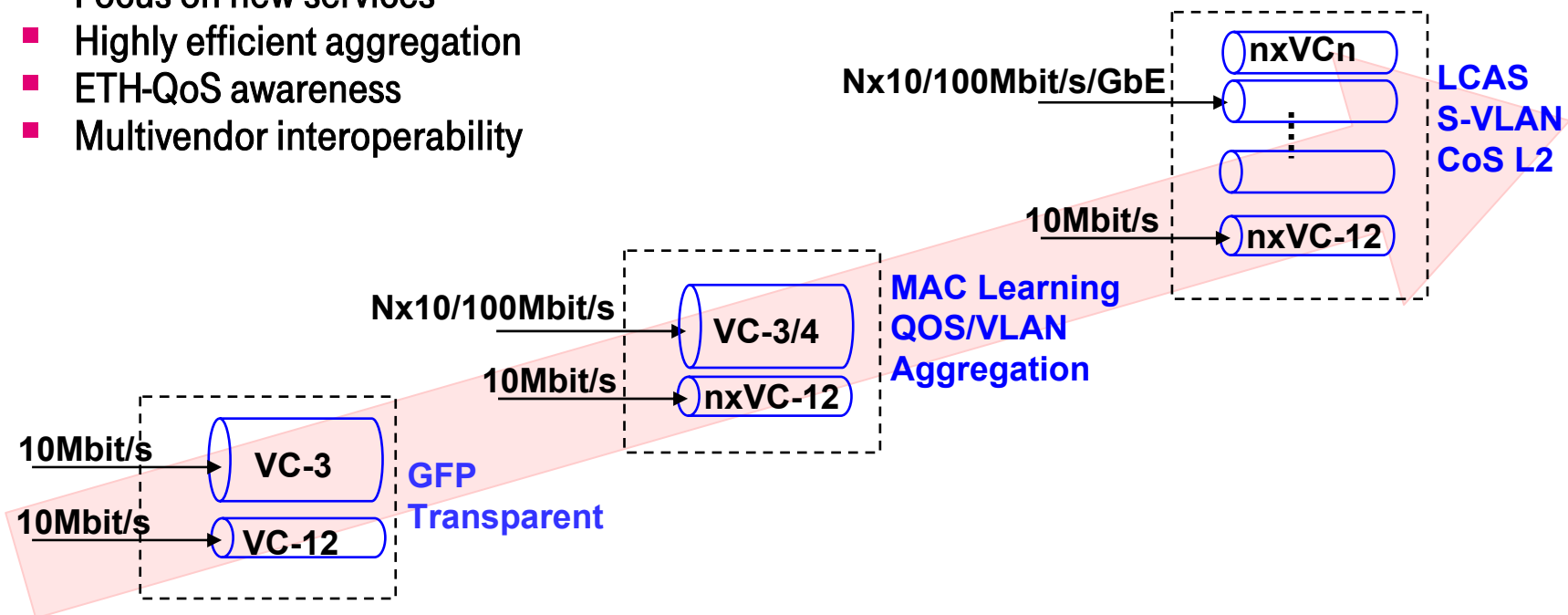
Transport Networks at T-Com
Ethernet over SDH



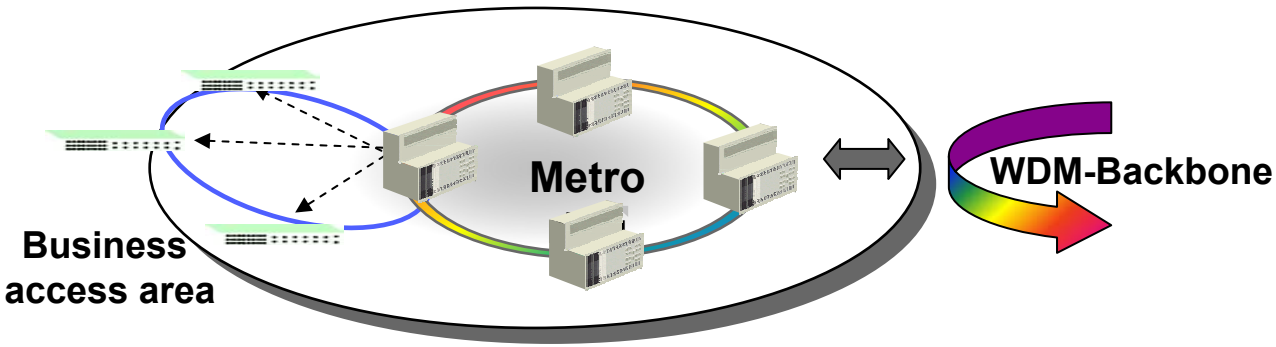
Transport Networks at T-Com
Ethernet over SDH evolution steps

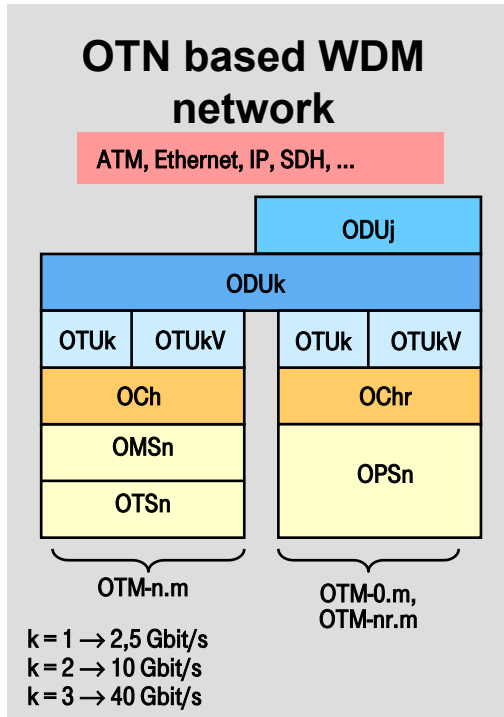
Based on a large installed SDH infrastructure evolution of data (ETH) and SDH integration consists of:

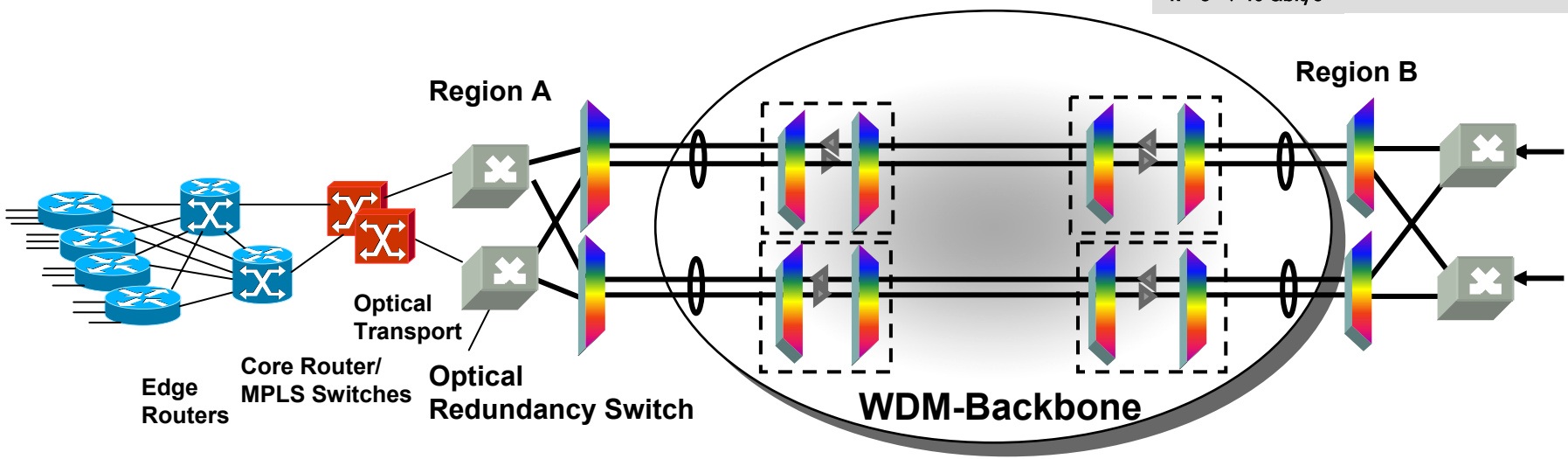
- Adoption of new/emerging SDH features like VCAT (ITU-T G.707), GFP (ITU-T G.7041) and LCAS (ITU-T G.7042)
- Augment SDH with data-aware functions
- Support of ETH L2 processing
- Focus on new services
- Highly efficient aggregation
- ETH-QoS awareness
- Multivendor interoperability



Transport Networks at T-Com
Ethernet over (Metro-)WDM





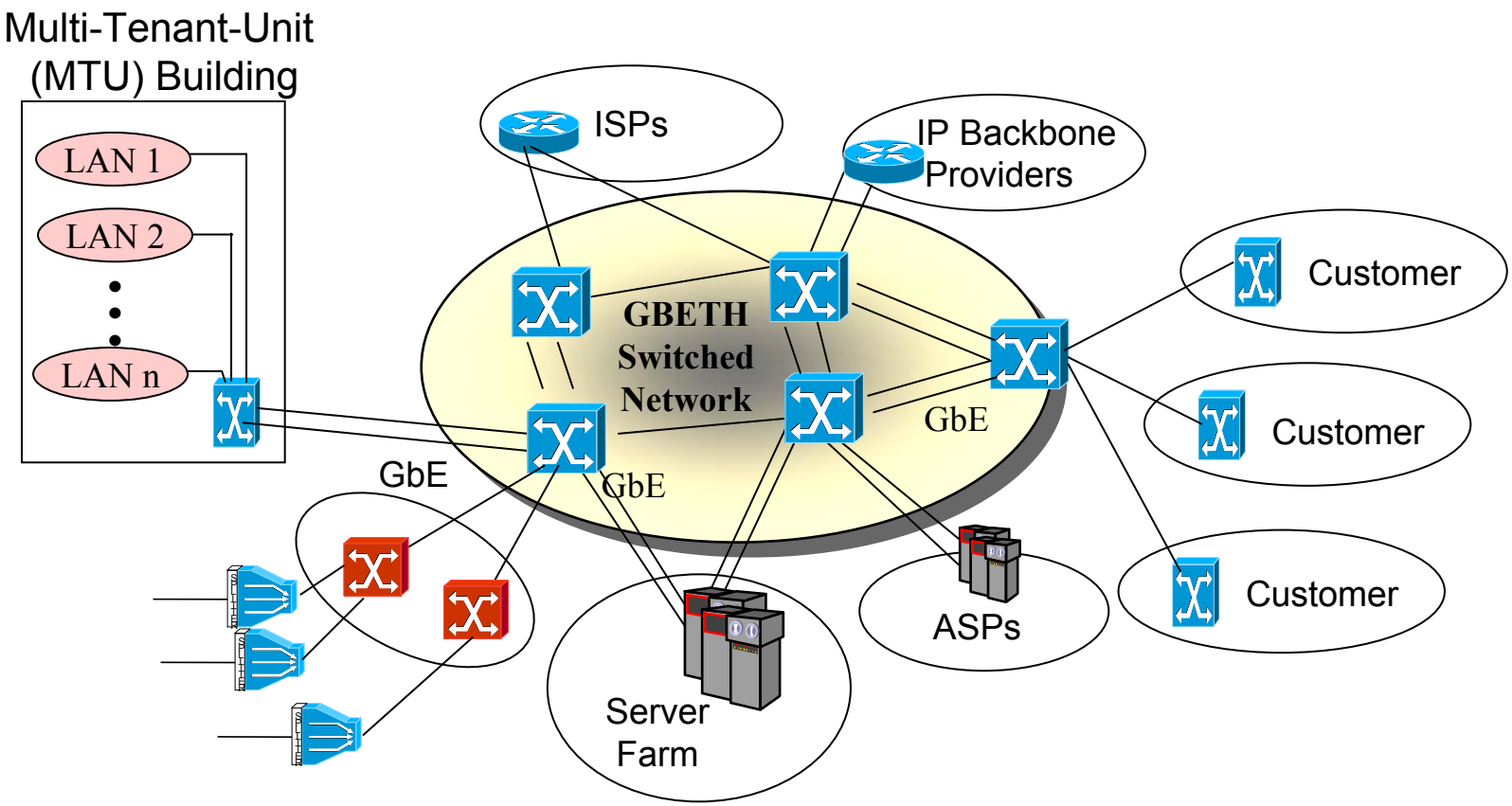


Transport Networks at T-Com
Ethernet over (Metro-)WDM evolution steps

- Metro WDM: Common technology for customer network solutions for e.g. GBETH, Fiber Channel, ESCON
- Multi user or location connection within or between Metros
- Point-to-point connections over dedicated infrastructure and common used infrastructure
- Introduction of OTN (ITU-T G.709)
  - Accommodates 2.5 Gbit/s, 10 Gbit/s, 40 Gbit/s signals
  - Service transparency for SDH/SONET, ETHERNET, ATM, IP, MPLS
  - Management enabler of WDM network by means of addition of:
    - Optical Channel (OCh) layer
      - STM-N, IP, ATM and Ethernet signals mapped ("wrapped") into OCh frame (OCh Data Unit (ODUk))
- Bundled 1GBETH EPL-Services
- Longer Term 10G LAN-PHY applications

Transport Networks at T-Com
Metro-Ethernet

Common Ethernet technology for customer network solutions

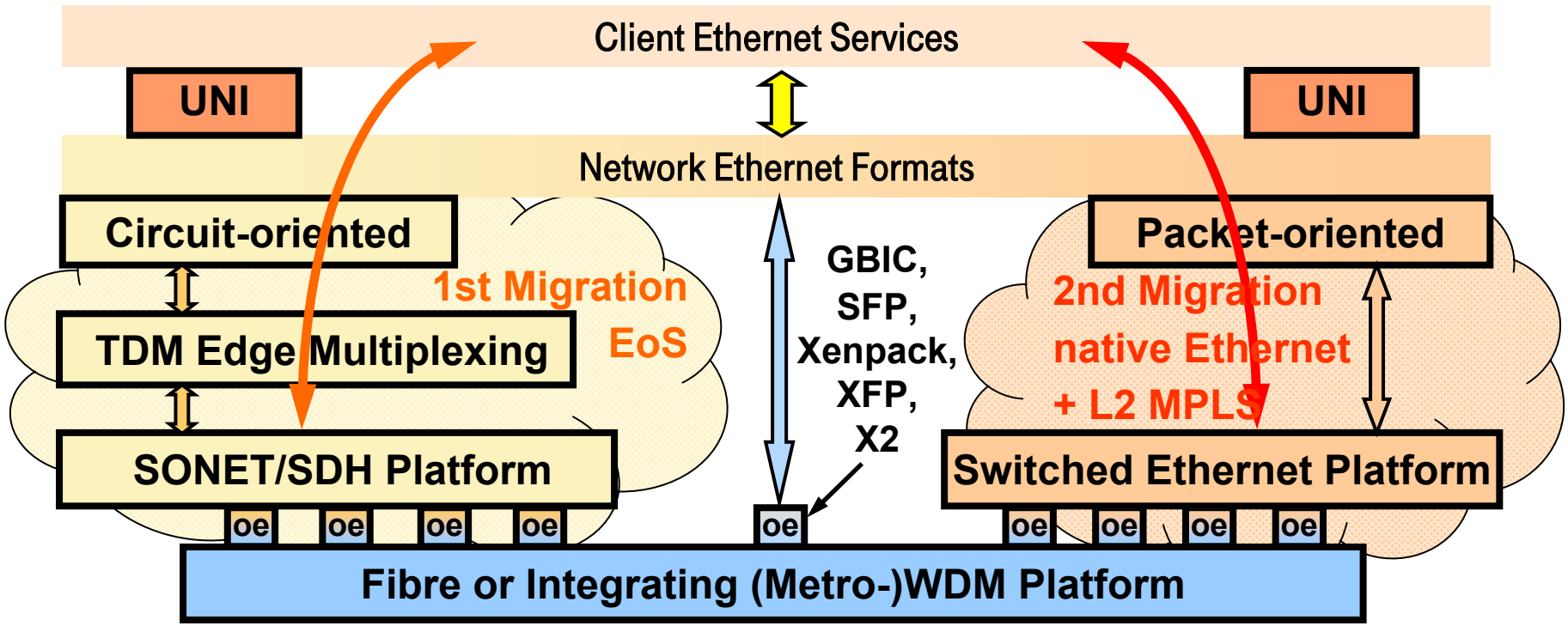


Transport Networks at T-Com
Metro-Ethernet

- Customer project based Metro-Ethernet-Transport-Platform for service products with high, middle sized and low quality requirements and high bandwidths.
  - Rapid provisioning of capacity in small increments (e.g., 1 Mbit/s)
  - Demand-oriented Ethernet-Services (Voice, Video, Data)
- Introduction of new standardized requirements (OAM, Security, Protection, Backbone Bridge, Address Space, etc.)
- Introduction of features addressing various aspects of Ethernet MAN/WAN transport (Equipment Functional Definitions, Architecture, etc.)

Transport Networks at T-Com
Evolution steps of Ethernet based Networks in the MAN/WAN

- "Ethernet over SDH" for a fast entrance into the growing market of Ethernet-products and provisioning of nationwide ethernet services
- On the long term integrating (Metro-)WDM-Platform for new ethernet services and circuit-oriented services



Thank you!