

# Photonic Networks

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# Toward New Generation Optical Networks (1)

- By 2015, 5bn people connected to the Internet
  - Data transport will increase by a factor of 100 vs. 2007
  - Need of optical networks to support Future / New Generation Networks with Peta bit/s traffic
  - Consistency of architecture vision of convergent networks
- Requirements for optical networks:
  - All-optical networks (no O/E/O conversion)
  - Ultrafast optical packet switching
    - Granularity flexible 160 Gb/s colored optical packet field transmission
  - Highly efficient transmission capacities
    - Joint-experiment Fraunhofer/Fujitsu 2.56 Tbit/s 160km OTDM
    - Spectral efficient (1 bit/s/Hz $\ll$ ) modulation format
  - Low power consumption
    - E.g. reduction of factor 550 in power consumption in BT exchange node
- Solutions for E2E optical access: P2P->WDM PON->Long-reach PON->Long-reach PON with intelligent optical core network
  - Need efficient utilization of optical test bed (e.g. JGN2)



# Toward Next Generation Optical Networks (2)

- NICT-funded and EC-funded research to deliver end-to-end optical networks and tackle various challenges of:
  - Access:
    - Long-reach PON to reduce deployment and maintenance costs
  - Core:
    - Ultra-fast large scale optical switching technology
    - Waveband and wavelength level switching node technology
    - Concentration and cascading of nodes demands for ultra long-haul systems and ultra low loss components
    - Architecture and networking of photonic network with multiple switching granularity
  - Protocols:
    - Packet-aware transport for efficient aggregation
    - Expansion of Ethernet from metro to core
  - Environment:
    - Optical transport for its big potential for huge energy savings (low power consumption and flexibility)



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