



- ▶ A global telecommunication systems and solutions vendor
- ▶ Over 35 years experience in the telecoms market
- ▶ €160 million Group's revenue in 2013
- ▶ Over 1,900 employees worldwide
- ▶ Based in Athens, Greece. Presence in 16 countries
- ▶ Exports to 70 countries
- ▶ Leading participation in more than 120 international R&D projects

SPEED-5G

- ▶ Minimum latency frame structures.
- ▶ Backhaul topologies with redundancy and offloading.
- ▶ Protocol for central nodes in backhauling for redundancy and resource balancing.

CHARISMA

- ▶ Management of PtMP backhaul network elements with SDN.
- ▶ Edge (ICN) caching.
- ▶ Security as a network function for applications.

VirtuWind

- ▶ SDN east-west interface across domains.
- ▶ Deterministic networking with IP for industrial networks.
- ▶ Application of NFV to industrial networks.

Status

- ▶ mmWave and Microwave backhaul
- ▶ E-Band: macro/micro/small-cell backhaul, C-RAN fronthaul, up to 3 Gbit/s full-duplex Ethernet
- ▶ V-Band Small-Cell Backhaul: up to 1.7 Gbit/s full-duplex Ethernet
- ▶ Software-Defined Radio
- ▶ AMC up to 4096-QAM
- ▶ Point-to-Point (PtP) or Point-to-MultiPoint (PtMP) on a single hardware
- ▶ Frequencies: 26 / 28 / 32 / 42 / 60 / 71-76 / 81-86 GHz
- ▶ Automatic frequency scanning for interference detection and channel selection

Future Work

- ▶ Increased channel bandwidths and data rates
- ▶ Beamforming - Phased Antenna Arrays
- ▶ Improved FEC performance
- ▶ mmWave Access & Backhaul



Goal

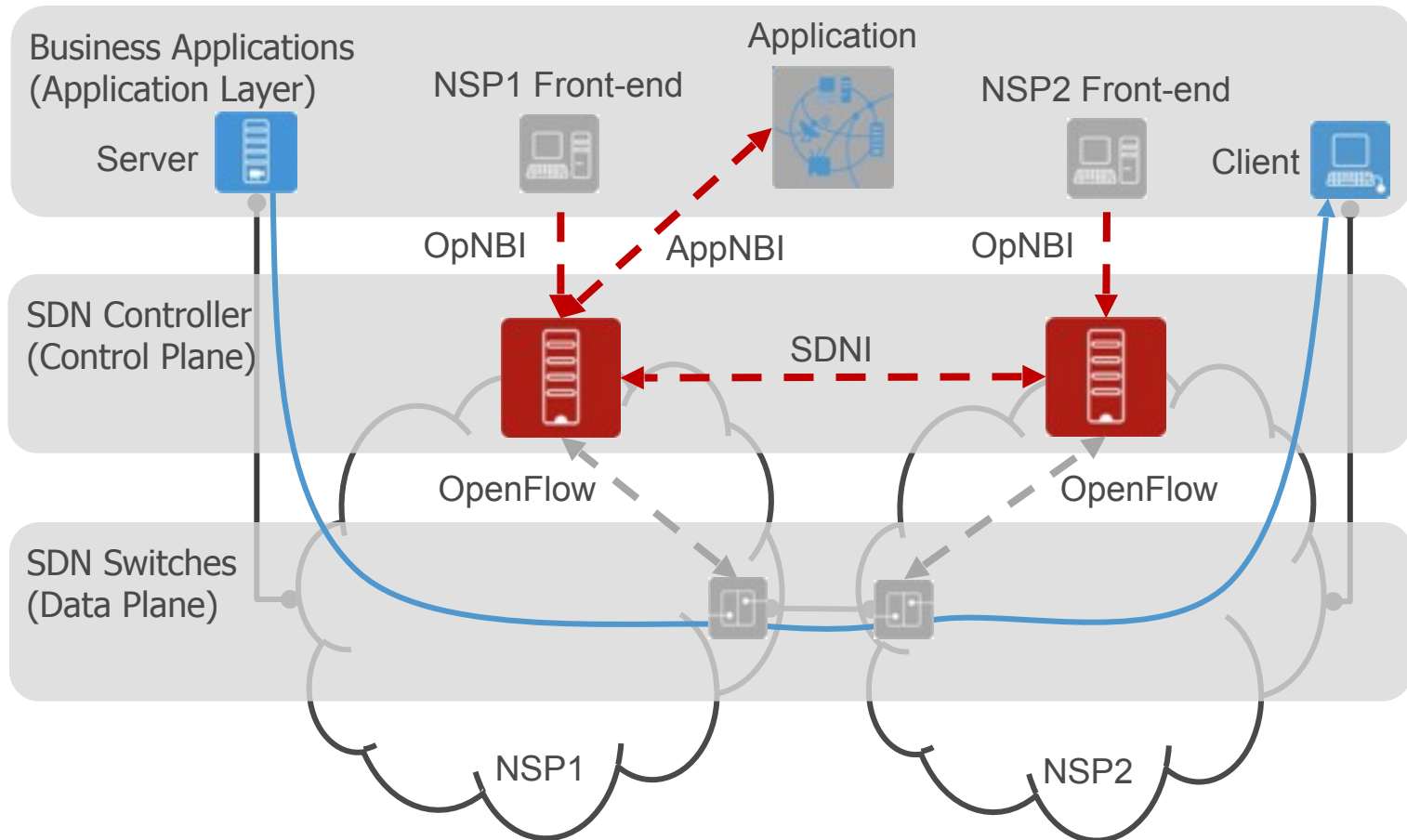
- ▶ Hop-by-hop path computation across ASs
- ▶ Path provisioning for (near-)real-time applications
- ▶ Leveraging SDN

Status

- ▶ Initial version of Application NBI (flow requirements)
- ▶ Initial version of Operator NBI (operator policy)
- ▶ Initial version of SDNI (flow negotiation)
- ▶ Local flow configuration with MPLS
- ▶ Testbed with OpenDayLight and OpenVSwitch
- ▶ Evaluation as admission control system

Future Work

- ▶ Strategic players (applications and operators)
- ▶ Security considerations
- ▶ Various traffic classification technologies (DiffServ, VLAN, etc.)
- ▶ Real SDN switches
- ▶ Comparison with 'Global Broker' approach
- ▶ Contribution to IRTF SDNRG



thank
you

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