TeraStream - mreža budućnosti

Terastream@HT Pilot Project

Life is for sharing.

TELECOM GOING FORWARD

CUSTOMER EXPERIENCE

- Customer intimacy
- Innovative products
- Superior care

GROWTH

- Voice
- BB monetization
- Cloud-based services

EFFECTIVNESS

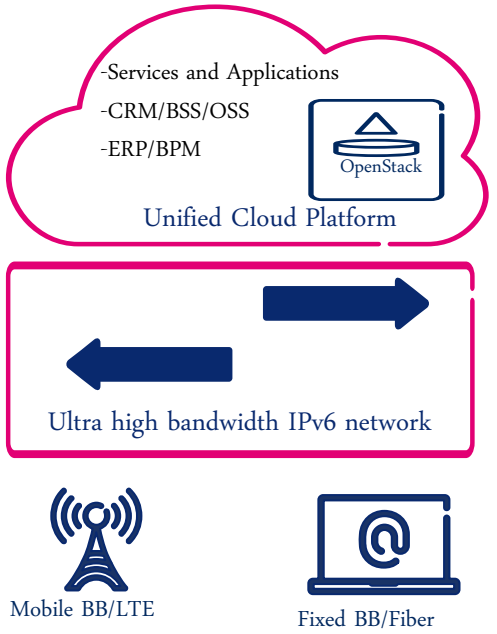
- “Zero touch” interaction
- Value creation operating model
- Network infrastructure simplicity

NETWORK AS TRANSFORMATION LEAVER

REQUIREMENTS

- Resiliance
- Capacity
- Simplicity
- Openess

NETWORK ARCHITECTURE



Our Challenges – Why Terastream

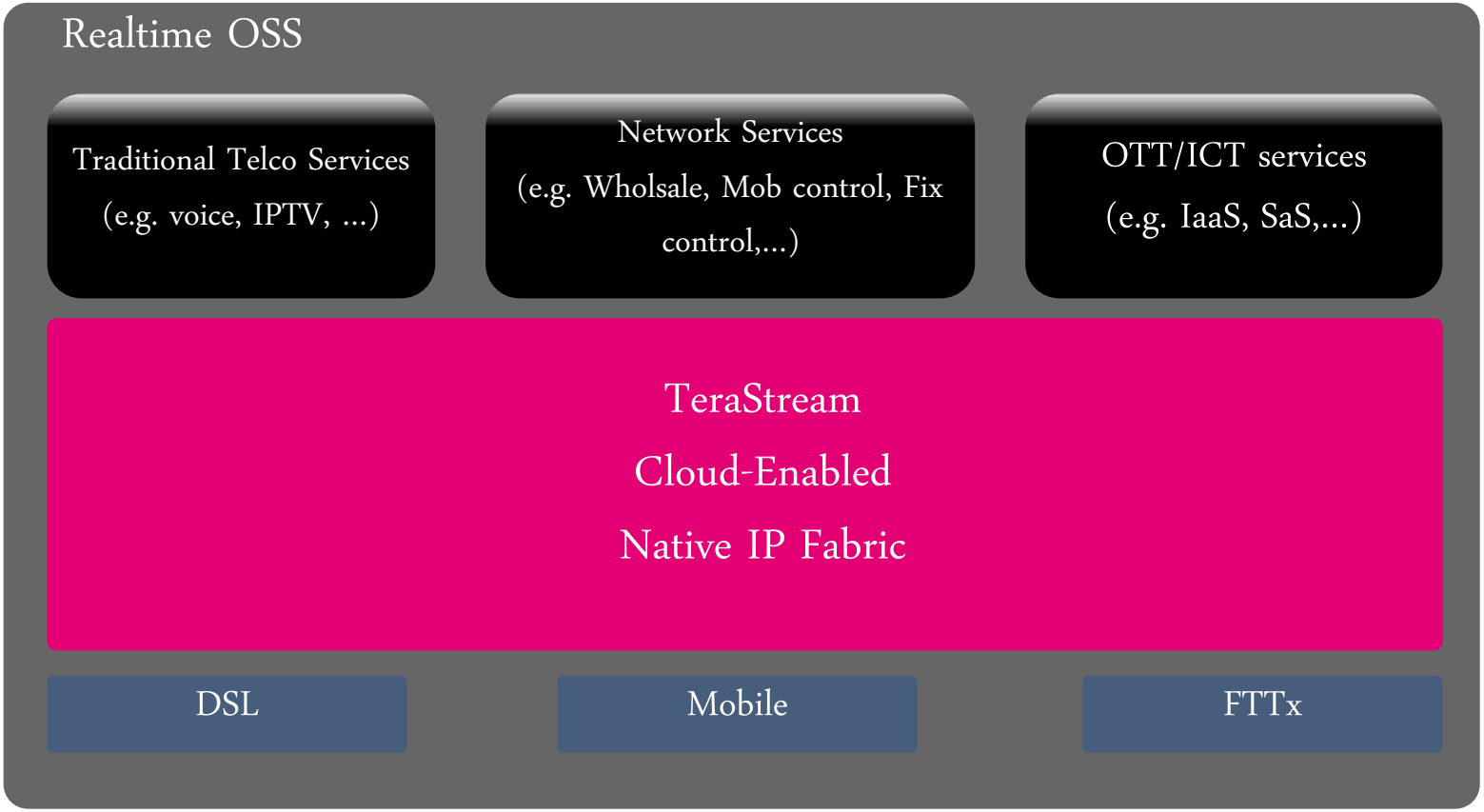
"The applications and tools needed to actually run the network and deliver services would largely be housed in the data centers: "We would use the cloud services paradigm for our service delivery," said Clauberg.

A big issue for DT to sort out is its Service Provider Information Technology (SPIT) set-up, particularly its OSS capabilities. "There are a lot of legacy issues with **OSS -- it's often the major cause of delays in bringing new services to market**," noted Clauberg, adding that DT is planning to build a "new real-time OSS to overcome" these issues.

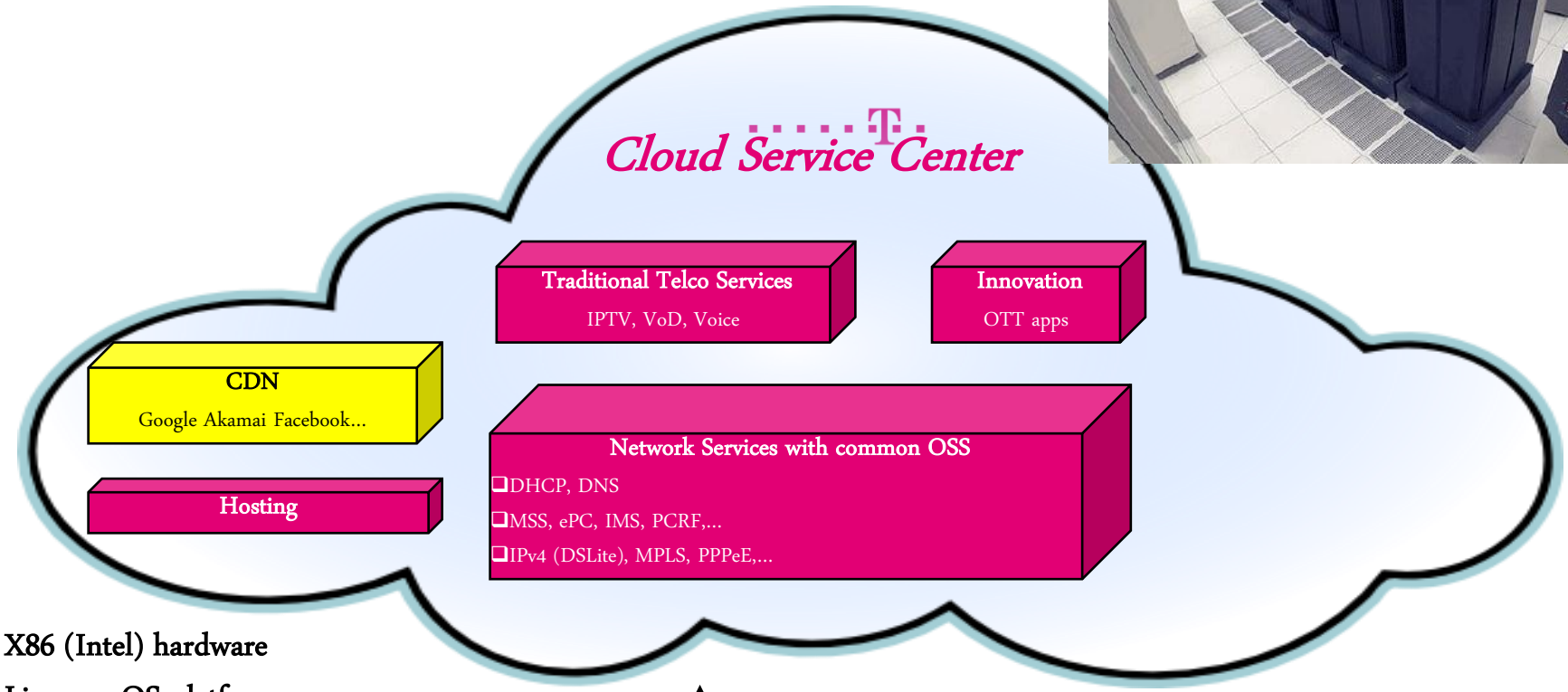
The OSS layer would be the glue between the network and the service capabilities housed in the data center, leading DT towards a more software-defined networking (SDN) model whereby the network can become a programmable entity that can be managed centrally. To this end, Clauberg sees a role for the OpenFlow SDN protocol that has stirred quite a bit of controversy in the industry in the past year."

http://www.lightreading.com/document.asp?doc_id=218658

TeraStream Building Blocks



What's in the Cloud ?

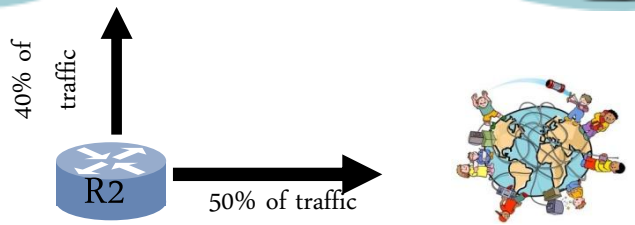


X86 (Intel) hardware

Linux as OS platform

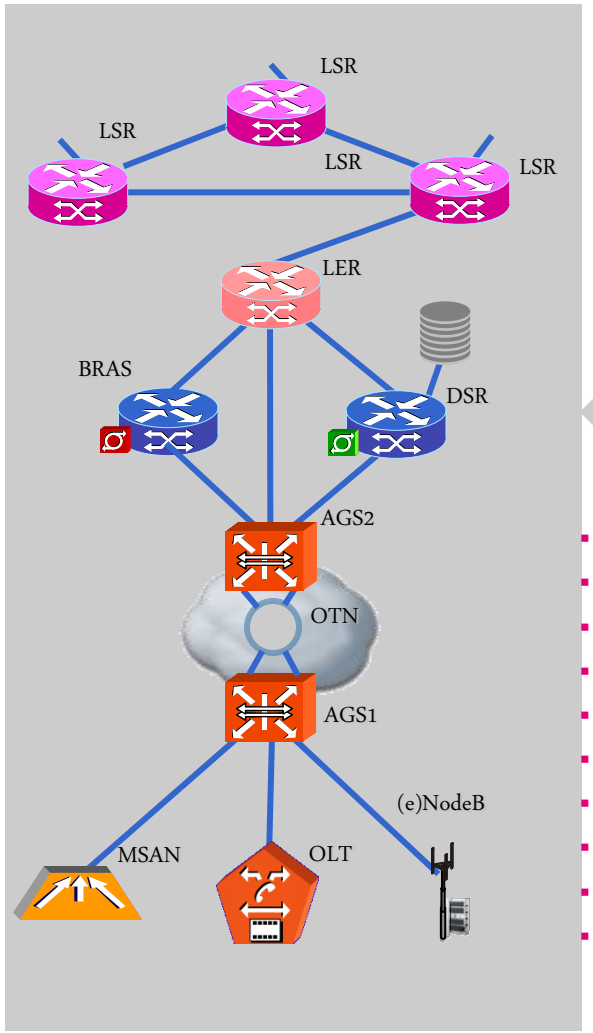
OpenStack as cloud software

KVM as hypervisor



Simplicity

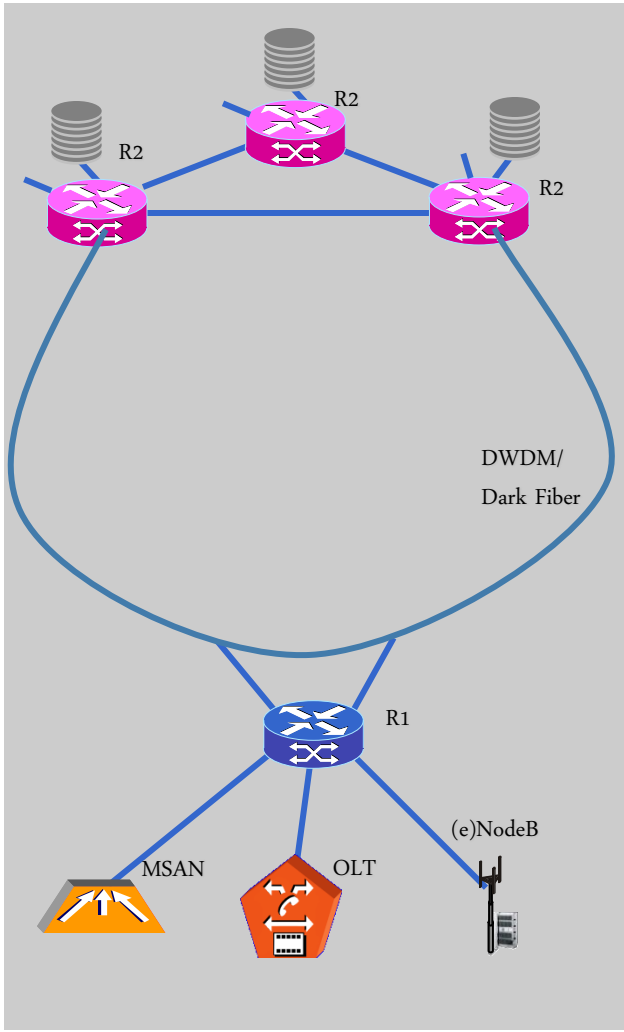
Typical IP Network



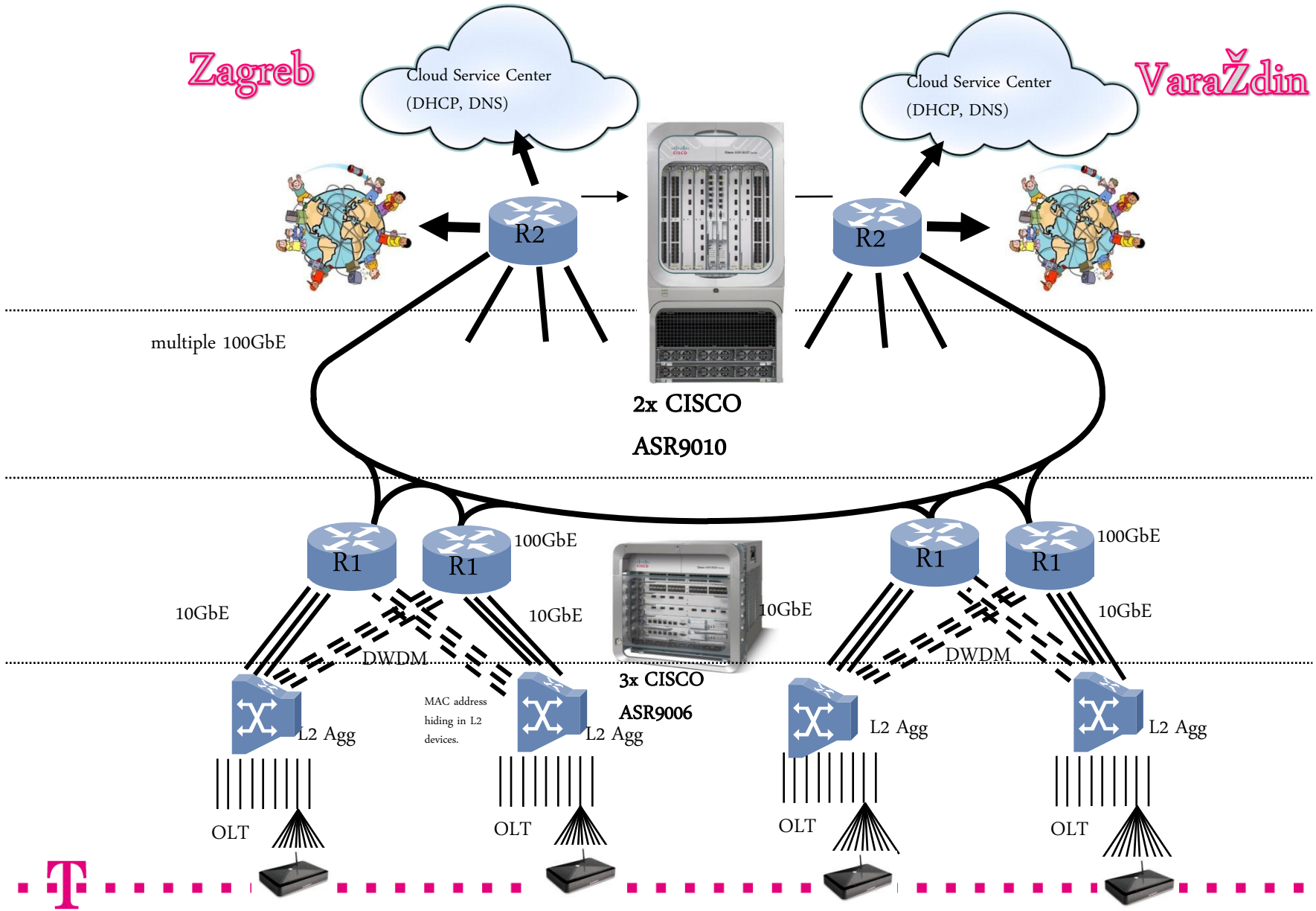
Complex → Simple

- AGS - Aggregation Switch
- BNG - Broadband Network Gateway
- BRAS - Broadband Remote Access Server
- DSR - D-Server Router
- DWDM- Dense Wavelength Division Multipex
- LER - Label Edge Router
- LSR - Label Switch Router
- MSAN - Multi Service Access Node
- OLT - Optical Line Termination
- OTN - Optical Transport Network

TeraStream network



Introduction of TeraStream Pilot

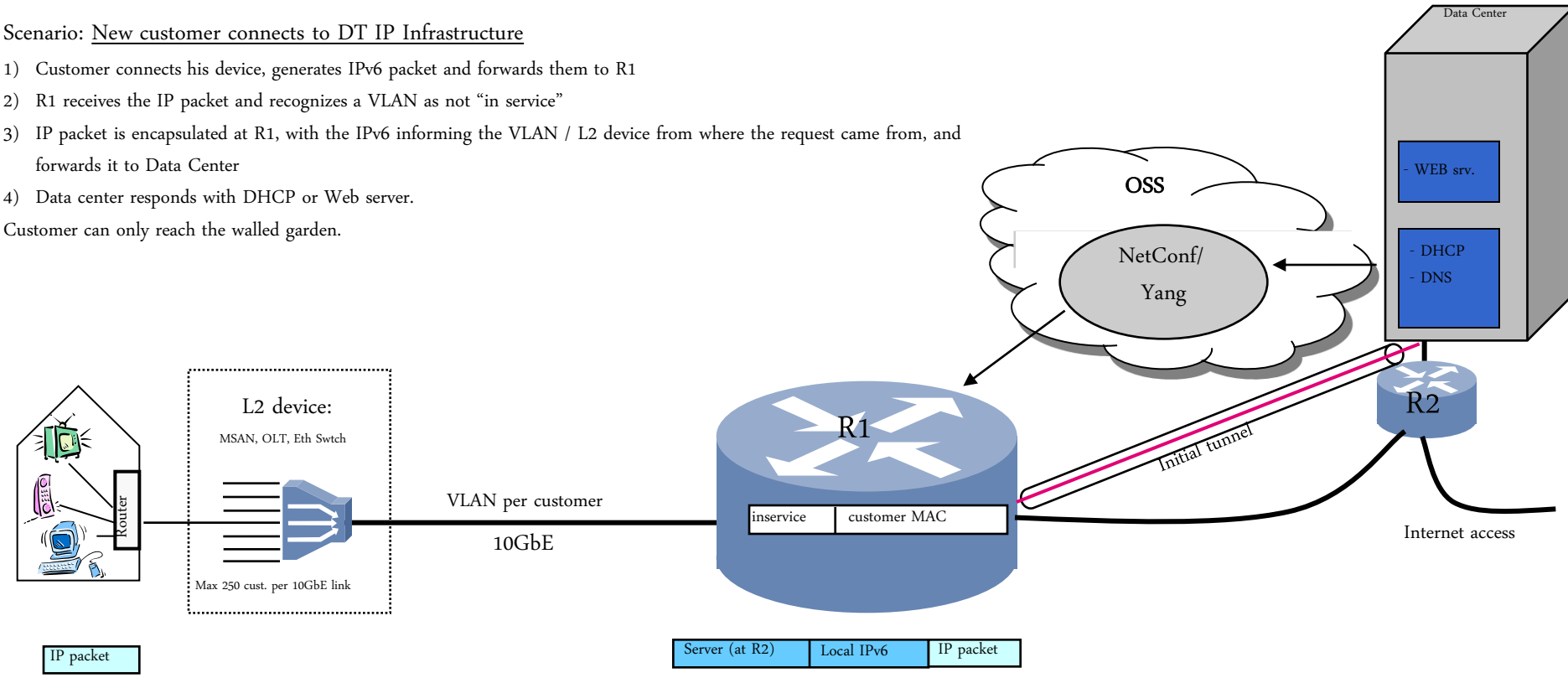


Customer connection usage example

Scenario: New customer connects to DT IP Infrastructure

1) Customer connects his device, generates IPv6 packet and forwards them to R1
2) R1 receives the IP packet and recognizes a VLAN as not "in service"
3) IP packet is encapsulated at R1, with the IPv6 informing the VLAN / L2 device from where the request came from, and forwards it to Data Center
4) Data center responds with DHCP or Web server.

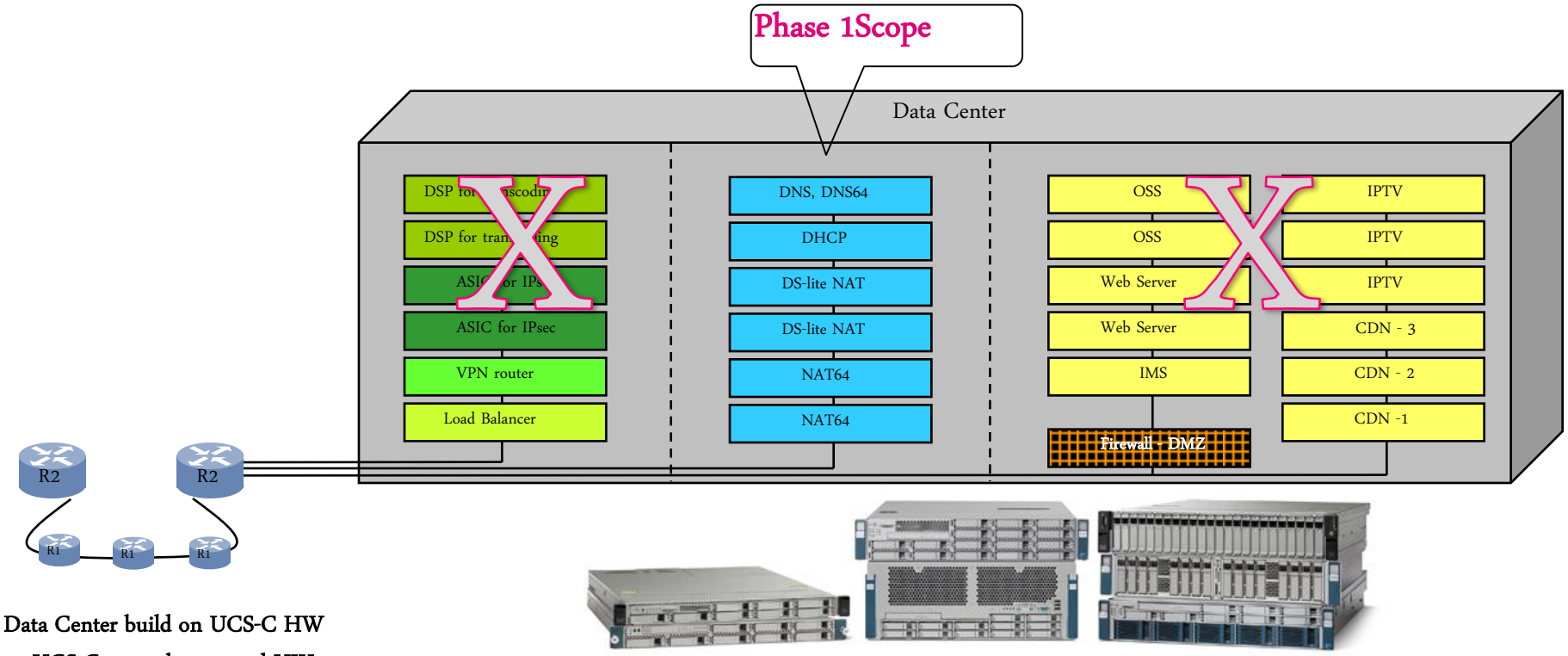
Customer can only reach the walled garden.



Scenario: customer registers

1) Web server at Data Center generates a request to OSS to configure a new customer via NetConf / Yang at router R1, Line ID.
2) The OSS via NetConf configures the R1 as "in service" for a customer located at a specific interface (IPv6 address).
3) From now on, the customer is outside the walled garden and can reach other Internet addresses.

Data Center Details

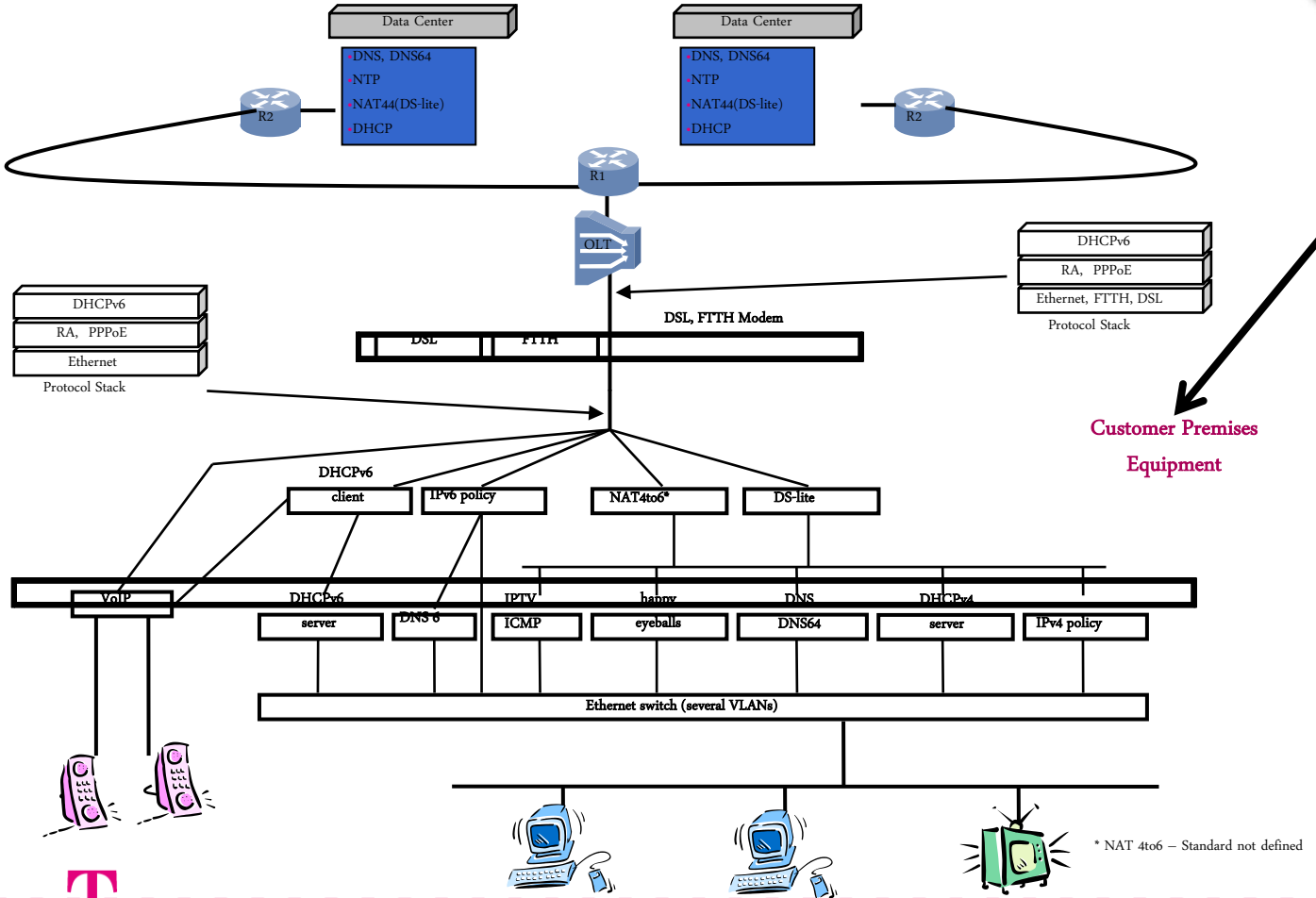


Data Center build on UCS-C HW

12 UCS-C240 rack mounted HW

- two Intel Xeon E5-2600 processor product family
- 384 GB of RAM with 24 DIMM slots
- X86 (Intel) hardware
- Linux as OS platform
- OpenStack as cloud software
- KVM as hypervisor

New Home Gateway Development



* NAT 4to6 – Standard not defined

TeraStream ShowCase Event

TeraStream phase 1

Basic Design Sketch	Detailed Planning & Lab Vendor Selection	Procurement	Deployment phase
June 1st 2012	Sept. 1st 2012	Oct. 20 2012	Dec. 5th 2012

Challenges

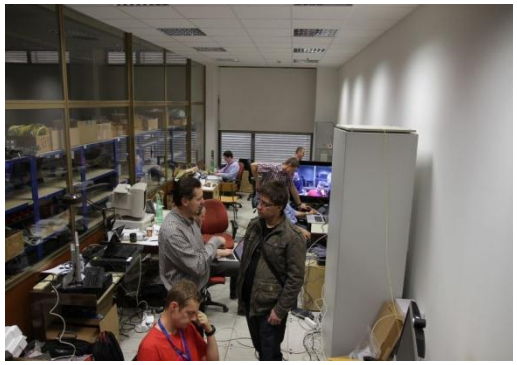
- Continuous change in BoM
- Parallel activities on deployment of network, DC and services with venue organization
- 4 companies involved

Combis – installation
CISCO- configuration
HT – venue organization
DT – strong support

Let's DO IT☺

Way of work

- Work in small teams (technology driven)
- Strong focus on daily activities
- High management attention
- Middle management directly involved



Can we DO IT?

Achievements

- Targeted milestones achived
- Venue was great success
- A lot of smilley faces
- Good off side celebration (at the evening)

YES WE CAN☺

IPv4 decommissioning strategy

The Internal IP network of TeraStream is IPv6. All IPv4 traffic to and from the customer will be translated to IPv6 at the borders of the network. 2 alternatives are seen as viable:

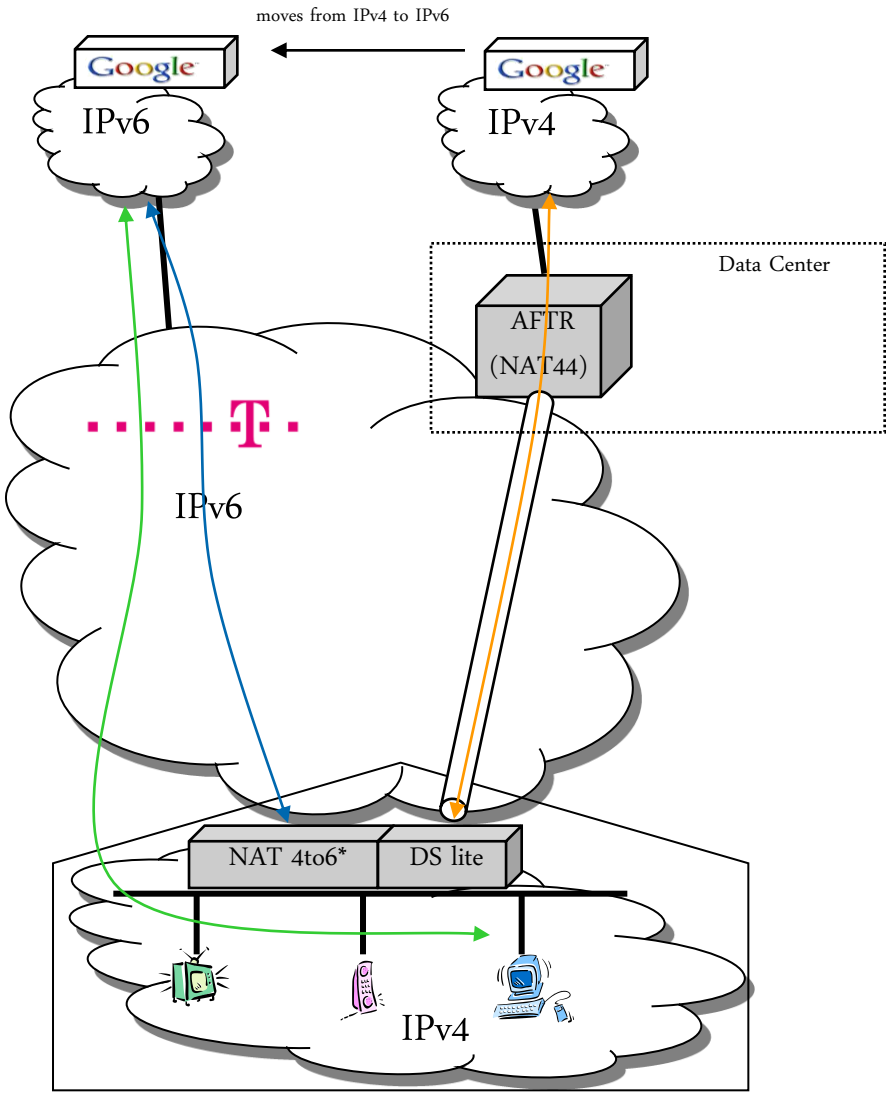
1) Customer IPv4 traffic is encapsulated on IPv6 via DS-lite to a AFTR (NAT44) element located at the Data Center.

2) Customer IPv4 traffic is translated to IPv6 at the customer's device (NAT 4to6). (Standard not defined)

In the long term, the expectation is that most customers will be IPv6 capable and that the services will move to IPv6.

In the transition time DS lite should provide the mechanism to connect IPv4 devices to other networks.

There is no standard describing NAT 4to6, i.e. translating IPv4 packets to IPv6. This standard remains for further work.



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Network as Service

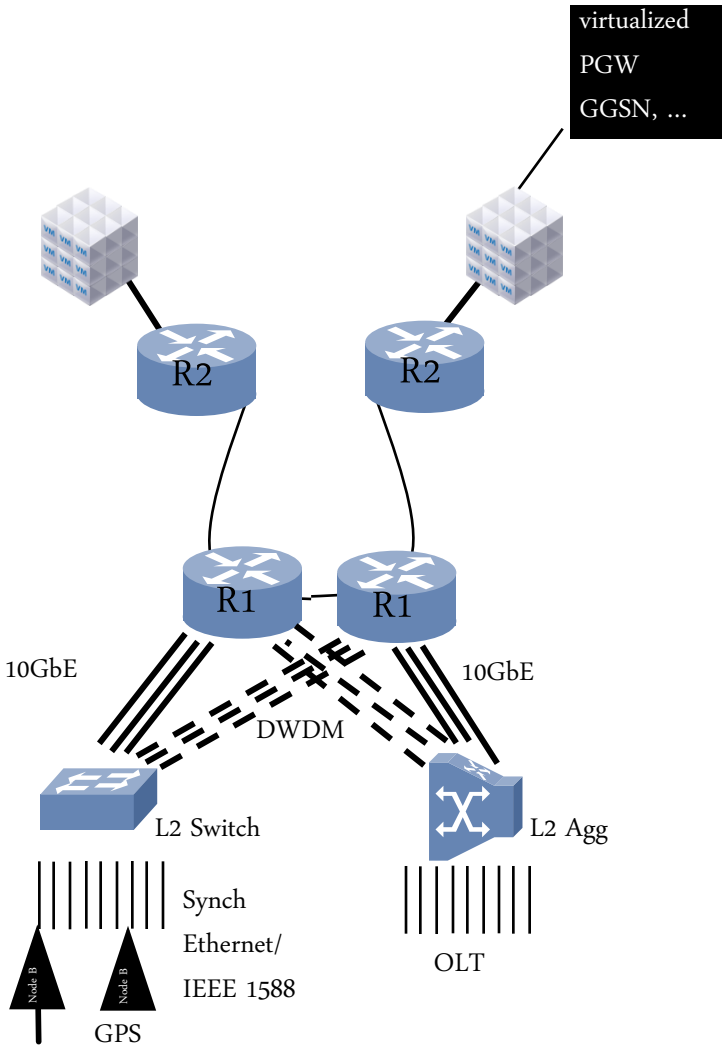
Example for Mobile

Fixed Mobile Convergence

- TeraStream has the scale to support future gigabit mobile and fixed networks
- Application mobility between fixed and mobile
- Service Center host virtualized mobile and common service platforms

Problem: Synchronization

- R1 will not support complex Synch Ethernet/IEEE 1588
- Solution 1: Ethernet aggregation with GPS / SynchE or IEEE 1588
- Solution 2: GPS at each (e)Node-B
- **Solution 3: IP synchronization**



Q&A