

From Bits to Data, from Pipes to Clouds

The network as an asset for convergence of Telecoms, IT and Media into an Internet of Knowledge



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Research and testbed around OpenFlow: OFELIA and SPARC

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OpenFlow – A new paradigm in networking

- Split network control and data paths by an open interface
- Implications of a standardized interface between network hardware and software

The project OFELIA

- Partners, duration, objective
- Status after phase one (what is available)
- Phase two (what are we working on?)

How to use OFELIA's test facility?

- Registration
- Setting up a project
- Configuring an experiment

OpenFlow-controlled access network

- PPPoE session setup and control in a split architecture

OpenFlow is an architectural platform



Unified control plane for packet and circuit networks

Simplified network control and management

Fostering innovative change

OpenFlow is part of the Clean Slate Internet Design initiative of Stanford

Currently first use for academic testbed facilities in the US, Japan, China, Korea

First commercial offerings of OpenFlow based systems

OpenFlow is not yet carrier-grade and needs extensions

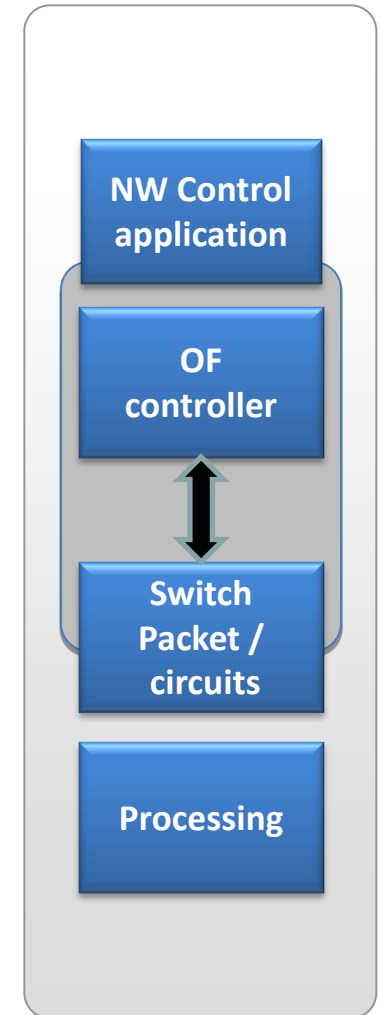
Optical and wireless technologies

Extend filter format description to generic labels

MPLS, Carrier Ethernet, IPv6, Optical circuits

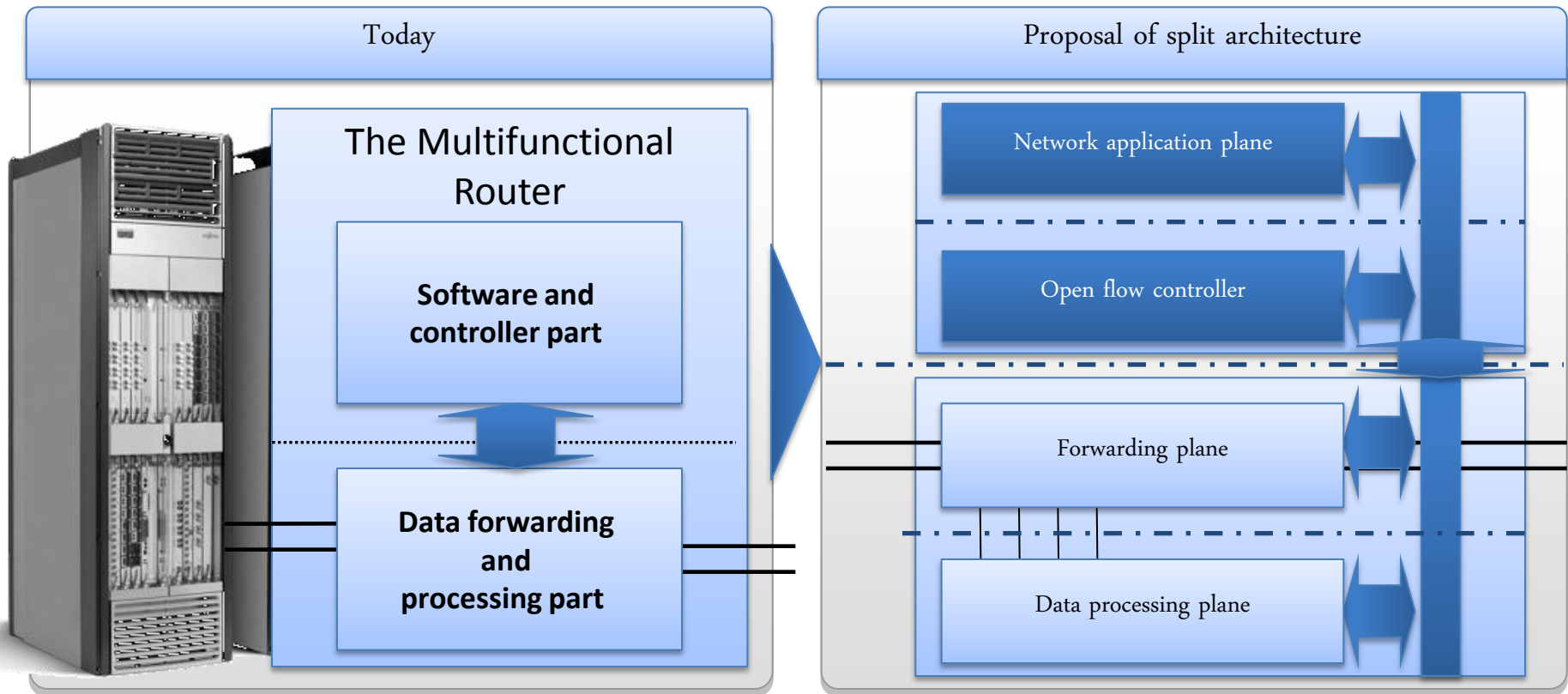
Resilience, redundancy

Network management, OSS



Essential of Split Architecture

How to split today's router.



Split of software centric and hardware centric part;

Split of application and control (software) split of forwarding and processing (hardware)

OFELIA - Operation and extension of the facility.

From isolated islands to federated resource management



Timeframe of project phases

- Operation of the individual islands, one partner per island has the lead
- Phase i: OF controllers and switches in place, first local experiments concluded
 - Phase ii: Connect islands and extend OF experimentation to wireless and optics
 - Phase iii: Automate resource assignment and provide connections to other FIRE and non-European research facilities

Gradual expansion of early operative facility

- Open Calls to extend facility & consortium will be published after M5 & M17
- Total budget €830,000 max. 200 K€ funding per experiment
 - First closed March 30, 2011, 2 new partners
 - second call will close end of March 2012

Promotion/ implementation of open calls

- Open Calls are be promoted through www.fp7-ofelia.eu and
- FIRE Station
 - Standard communication channels (mailing lists, IEEE ComMag)
 - Industry fora: Optical Internetworking Forum, Open Grid Forum

i: Create islands on L2

ii: Connect islands and extend to wireless/optics

iii: Ressource assignment automization and connection to other facilities

SPARC is an FP7 STREP within objective 1.1 “The Network of the Future” → <http://www.fp7-sparc.eu>

SPARC focus: adoption of OpenFlow for operator networks

Carrier grade extensions

Virtualization of network functions, e.g. UNI in access/aggregation networks

OAM functionality → per flow, interaction with legacy OAM

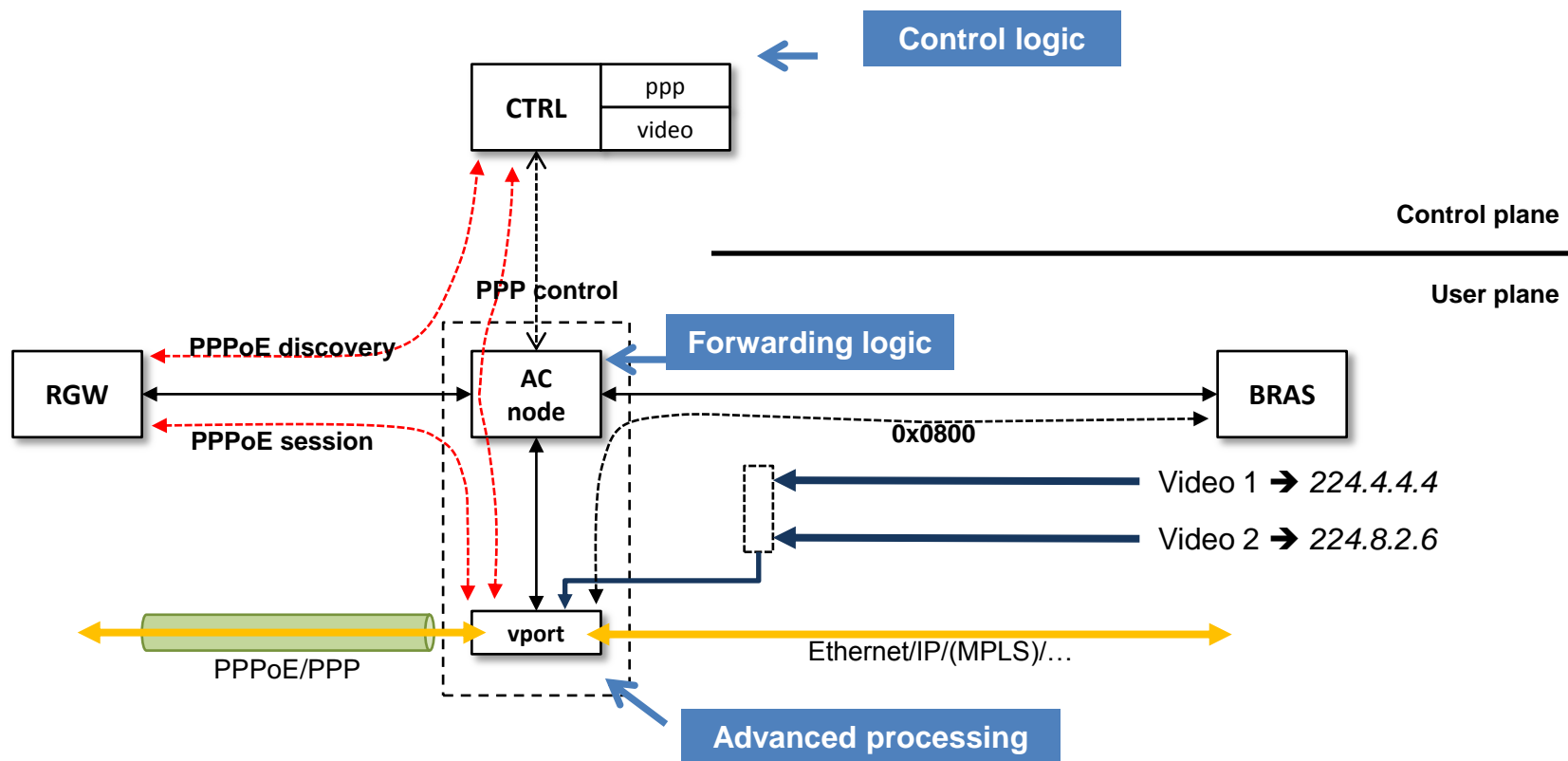
Network virtualization → running multiple control planes in parallel

Network management → unified management interface

OpenFlow enables smooth migration and deployment of new control planes on top of existing user planes

Demonstration:

Showcasing OpenFlow's forwarding and advanced processing



- Virtualized PPP based UNI
- OpenFlow for injecting multicast traffic (e.g. IP-TV) into PPP tunnel for legacy devices
- Virtual port provides PPPoE/PPP to Ethernet/IP adaptation functionality

A closer look on the internals of the PPP/PPPoE-UNI adaptation functionality

