

Network Virtualization – Results and Challenges

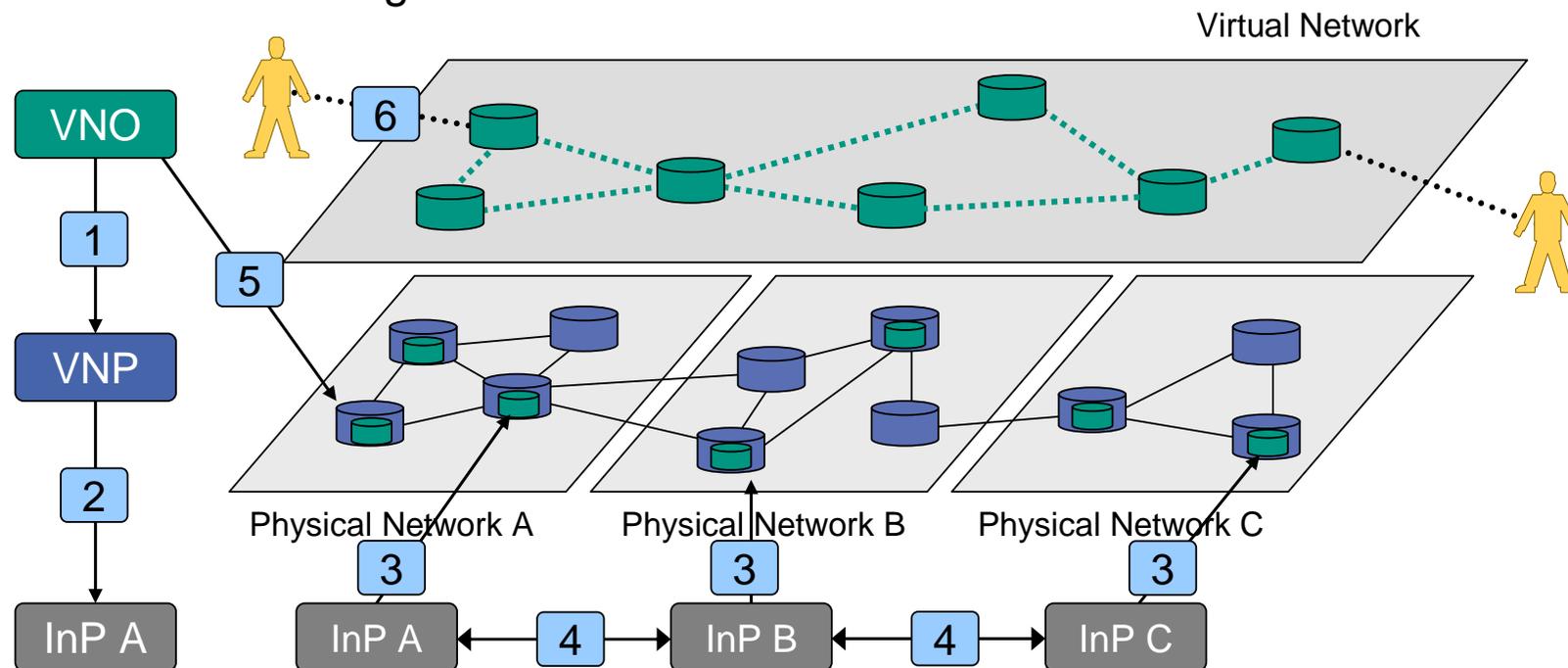
Roland Bless and Martin Röhrich

Institute of Telematics, Department of Computer Science



Network Virtualization – 4WARD Results

- Created an **architectural framework** for network virtualization in a commercial setting
- Maybe use **terminology** or **framework** as starting points?
 - different “provider” roles InP, VNP, VNO
 - various management and control interfaces



Exemplary Solution – Virtual Link Setup

- Creation of **virtual links with QoS guarantees** between virtual nodes
 - Virtual nodes possibly part of different InP domains
 - Setup of virtual nodes via management interface

- Necessary information to setup virtual links
 - **Substrate address** of each virtual node
 - **Tunnel type** to be used, e.g. L2 tunnel, IP in IP, GRE, ...
 - **VNet-IDs, VNode-IDs, virtual interface names**
 - Desired **QoS parameters** for the virtual link

- Use the **Next Steps in Signaling Framework** as signaling solution
- Don't create entirely new signaling application (NSLP)
 - **Extended QoS NSLP** with dedicated **VLSP object**
 - QoS has to be used anyway for virtual links with guarantees
 - required only few additional lines of source code <http://nsis-ka.org/>

Lessons learned / Open Issues

- Lessons learned
 - need a comprehensive virtual **network topology description**, e.g. XML-based
 - need to define **inter-domain/cross-provider interfaces**
 - hard, but important to get right
 - **security** must be built-in (e.g., isolation of VNets and authorized access to control)
- More work required on
 - signaling and control
 - end-user attachment
 - virtual nodes including virtual storage