



SIP in the Transition to next Generation Networks: Covering the Gap between IPv4 and IPv6

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Fraunhofer Fokus

- The Fraunhofer-Gesellschaft is the national research body in Germany
- One of the leading organizations for institutes of applied research in Europe, undertaking contract research on behalf of industry.
- At present, the organization maintains 56 research establishments at locations throughout Germany of which 16 work on networking and communication issues (total staff: some 11,000).
- The research establishment FOKUS is located in Berlin and has more than 200 employees divided in 8 competence centers.
- Activities SIP, QoS, multimedia and mobile communication, accounting, AAA and measurement.



History

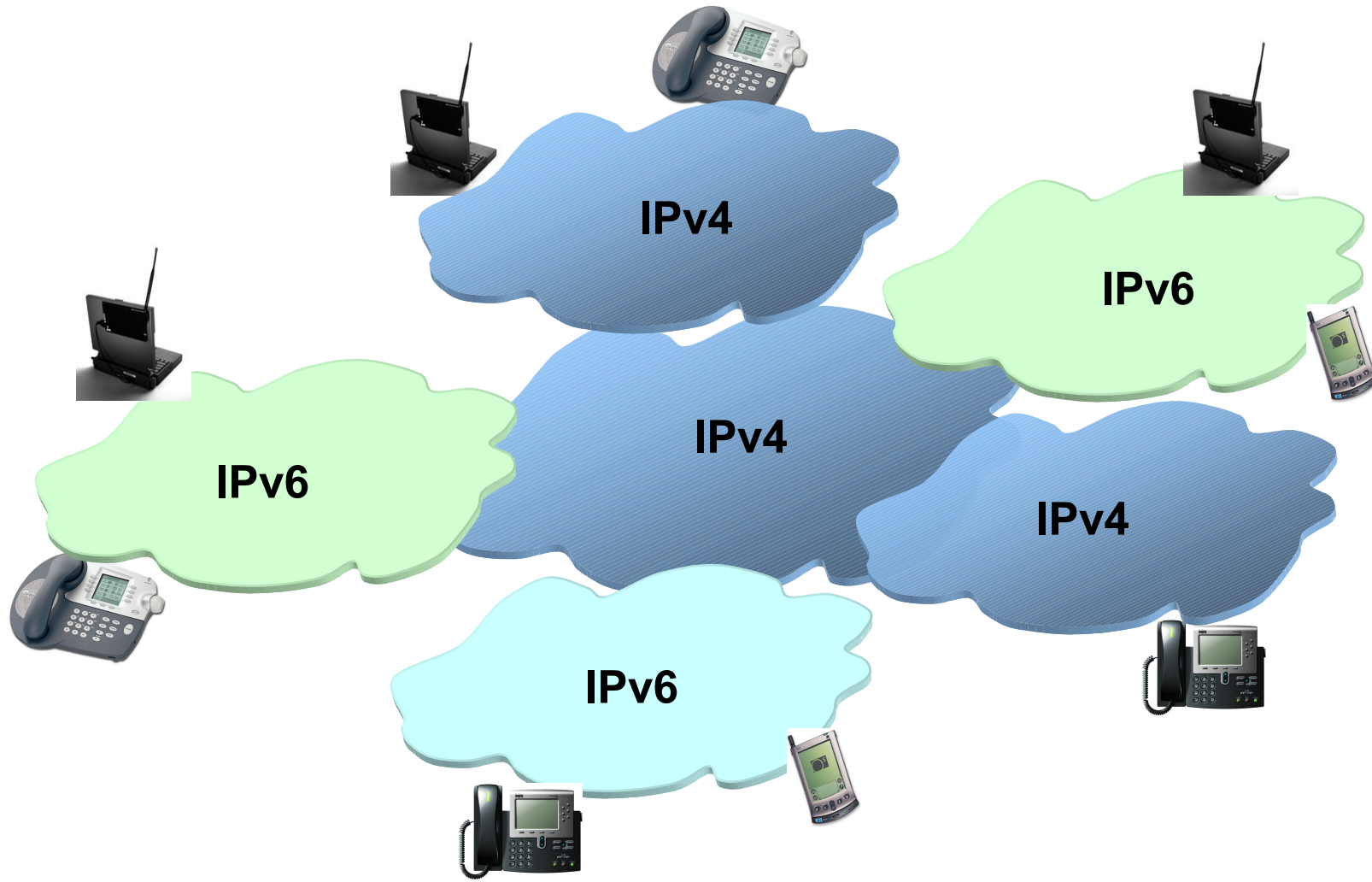
- Work on IP-Telephony and multimedia communication in the Internet started around 1995
- First SIP implementation and SIP based conferencing system implemented at Fokus 1996
- Extensive research in the area of VoIP, QoS, congestion control, FEC and multicasting
- More information on iptel.org



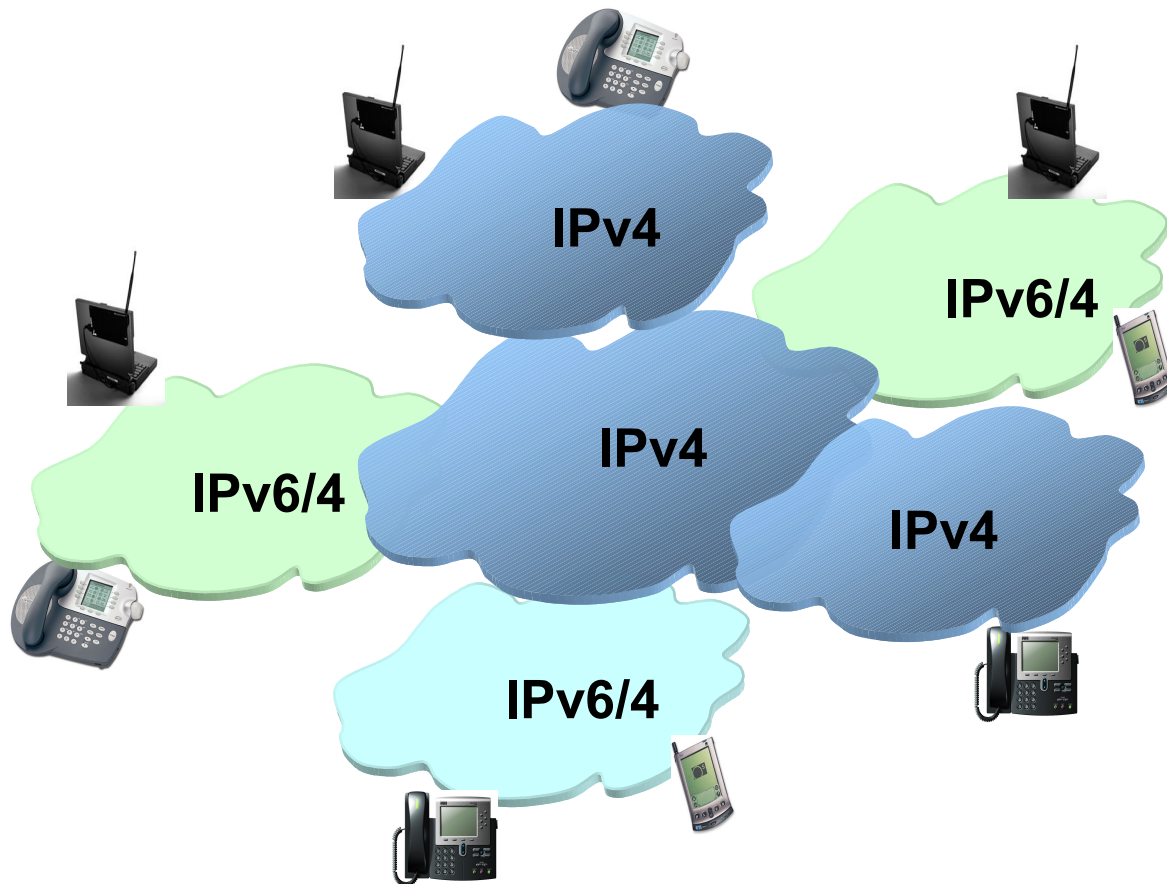
Why Move to IPv6?

- Next generation networks are said to be IPv6 capable. Why?
 - Support for nearly endless range of addresses
 - Remember even toasters and light bulbs in remote villages in China will be connected to the internet in the brave new world of NGN
 - Supposedly better support for QoS and routing
 - Simpler configuration and better methods for discovering servers
 - Remove the need for network address translators
 - Really?

Towards NGN Networks

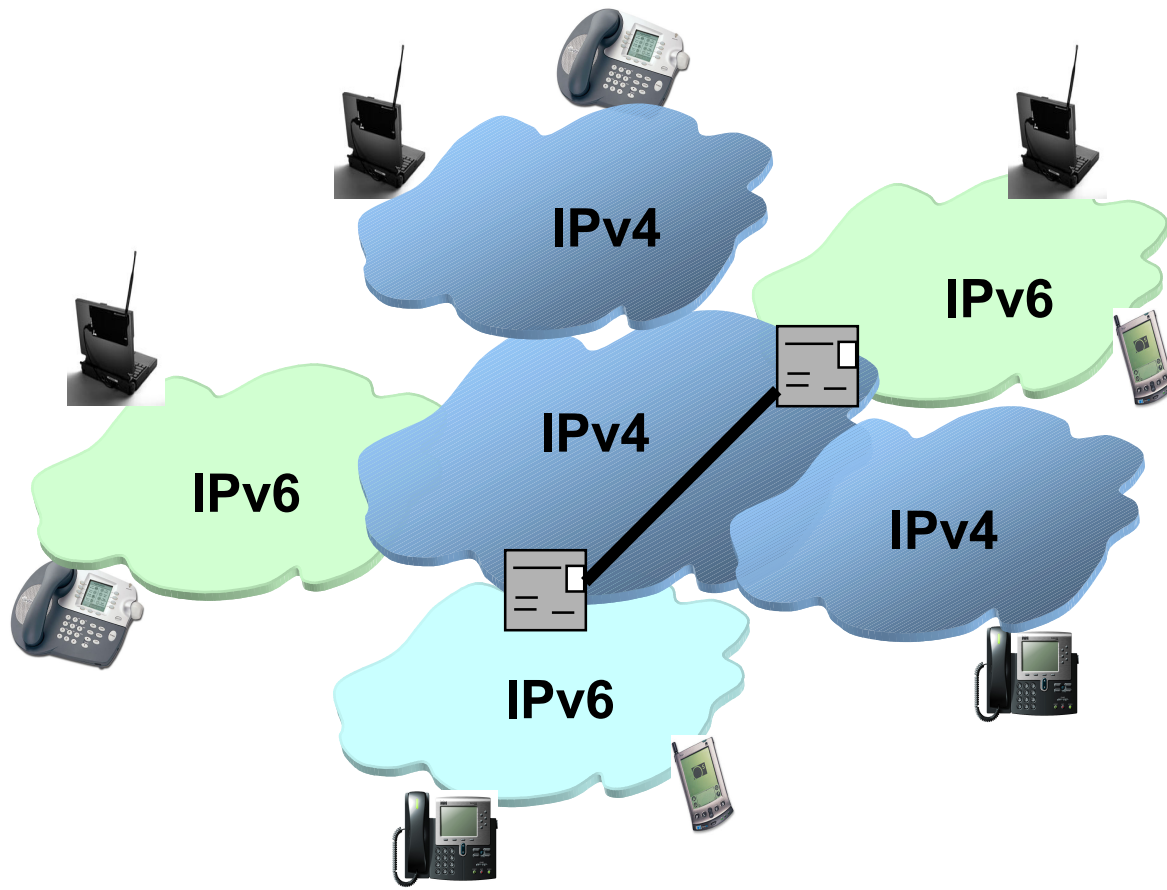


Towards NGN Networks: Dual Stack



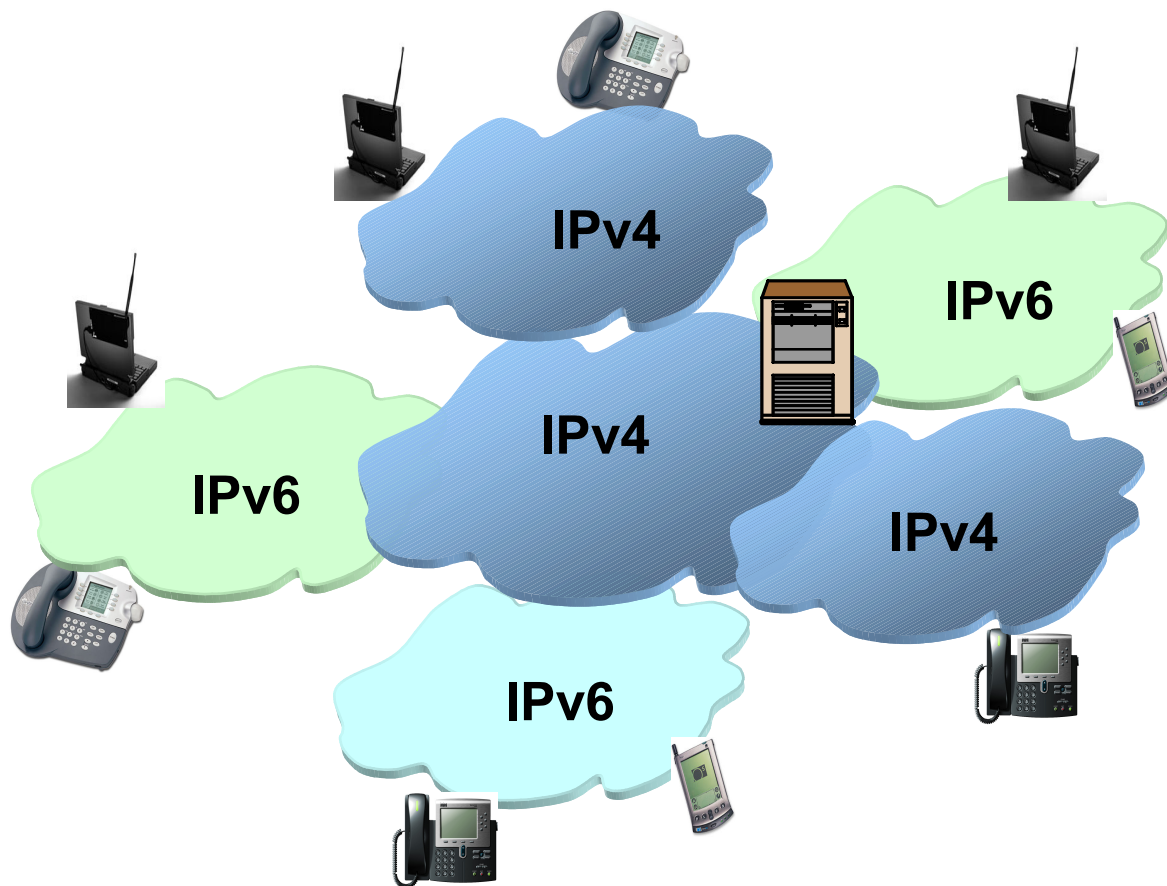
- IPv6 devices support also IPv4
- Requires IPv4 and IPv6 addresses for the end systems
- Networks need to support both IPv4 and IPv6 routing
- Applications need to cope with IPv4 and IPv6 messages

Towards NGN Networks: Tunneling



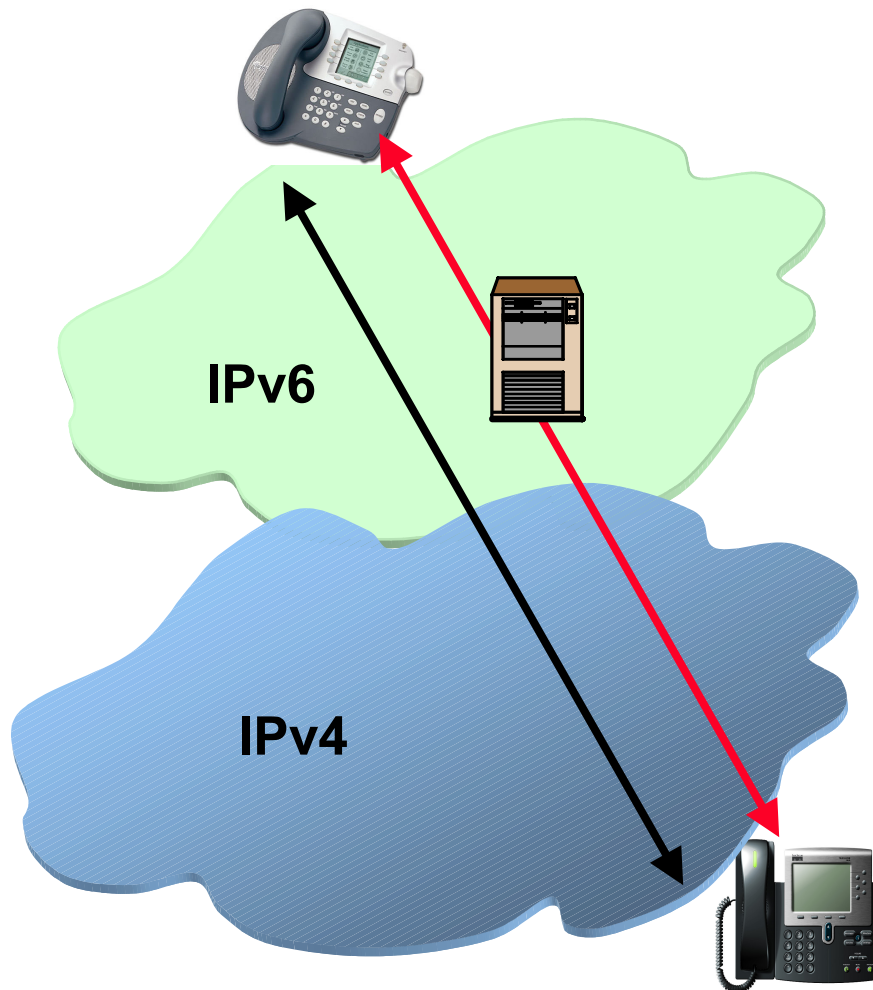
- Carry IPv6 messages as IPv4 packets
 - Administrators nightmare
 - Only for connecting islands of IPv6

Towards NGN Networks: Translation



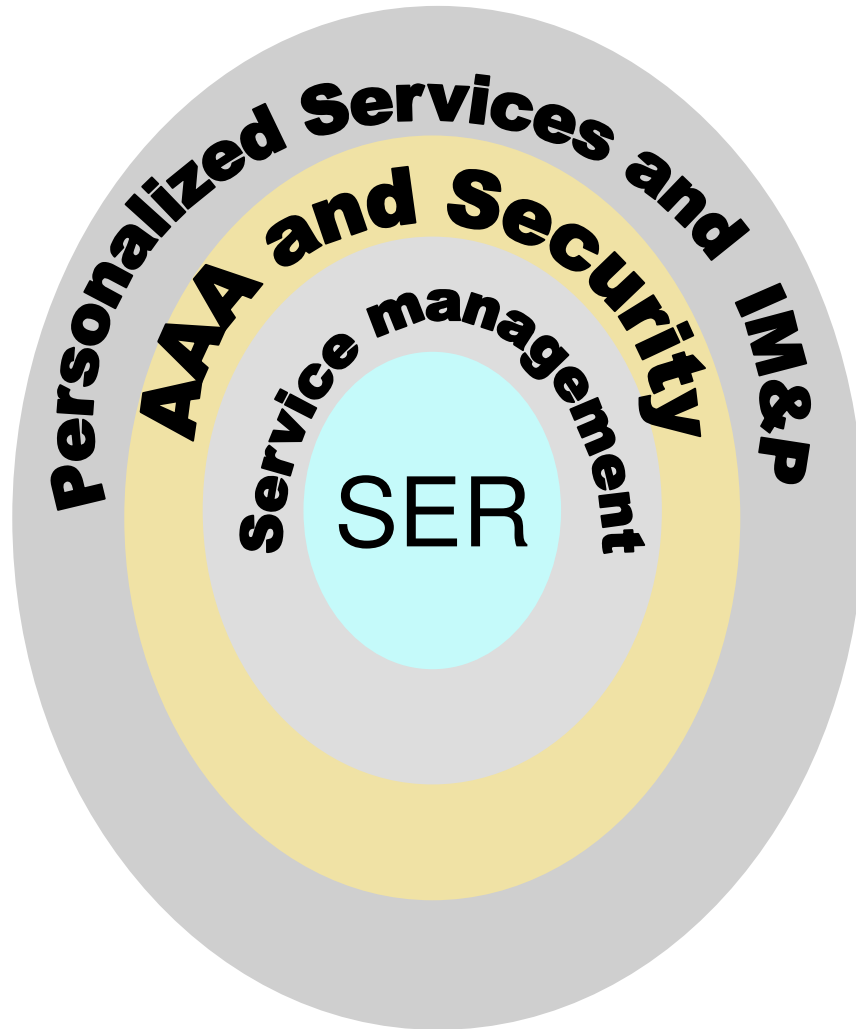
- Dedicated gateways translate packets from IPv4 to IPv6 and vice versa
 - Same problems as NATs, however, limited to network borders
 - Simpler networks (need only to support one IP version)
 - Simpler end systems and applications

SIP and IPv6



- Need end applications capable of IPv6
- Need proxies and registrars capable of understanding IPv6
- Need support for appropriate transition mechanisms for exchanging media and SIP signaling

IPv6 Capable SIP Infrastructure



- Implementation based on the SIP Express Platform:
 - Open source
 - Provides enhanced SIP functionalities with proxy, redirect, registrar and location management
 - Efficient implementation
 - Distributed and modular architecture
 - SMS, JABBER, IM&P support

SIP in Heterogeneous Environments: Problem Statement

- **Media translation**

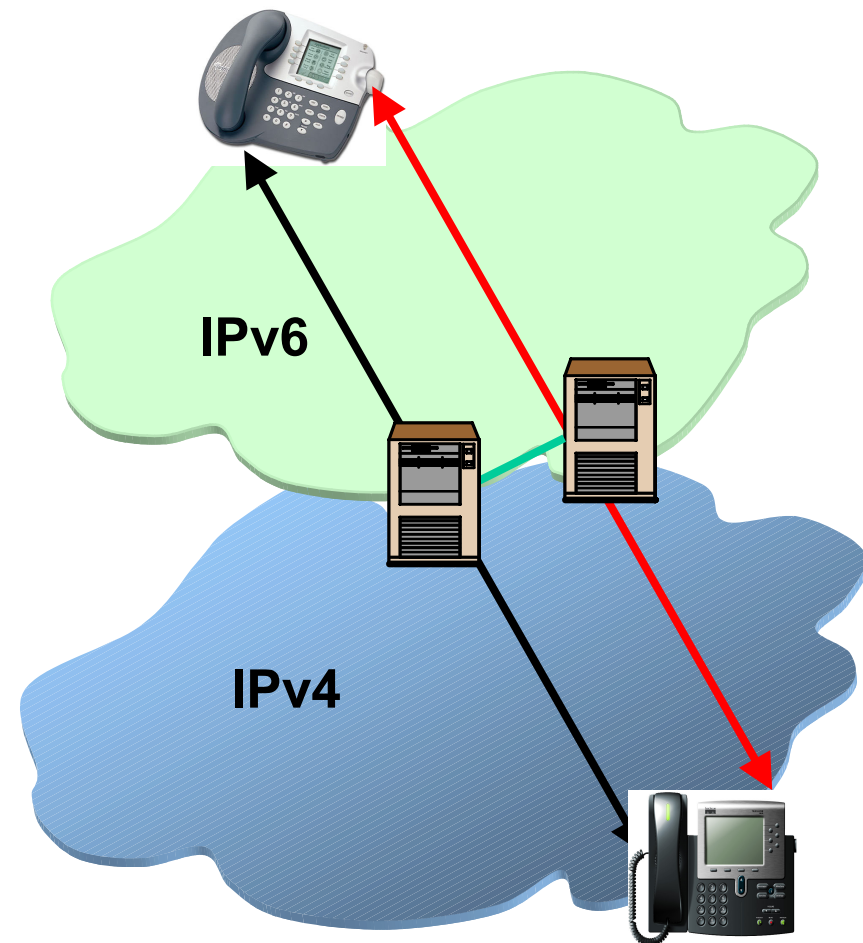
- Translate RTP packets between v4 and v6
- Translate RTCP packets between v4 and v6
- Manage several connections (UDP sockets) in parallel

- **Signaling translation**

- Translate the SIP IP addresses between v4 and v6
- Adapt possible included addresses
 - To, From, R-URI, Via, Record Route, Route
- Adapt addresses in the SDP body

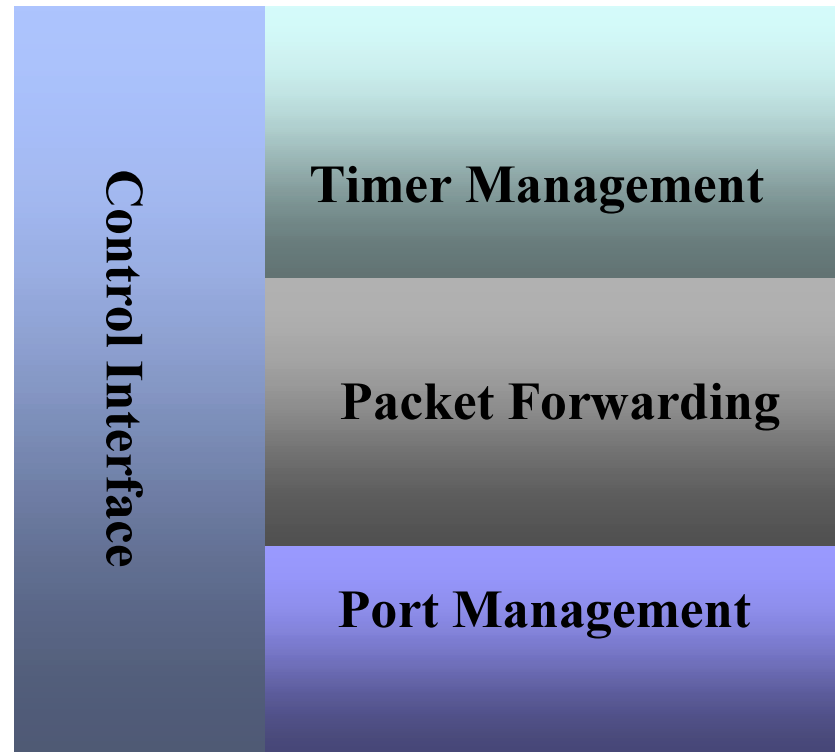
- **Signaling-Media coordination**

- Open the necessary ports for the media translation
- Refresh the ports
- Close the ports



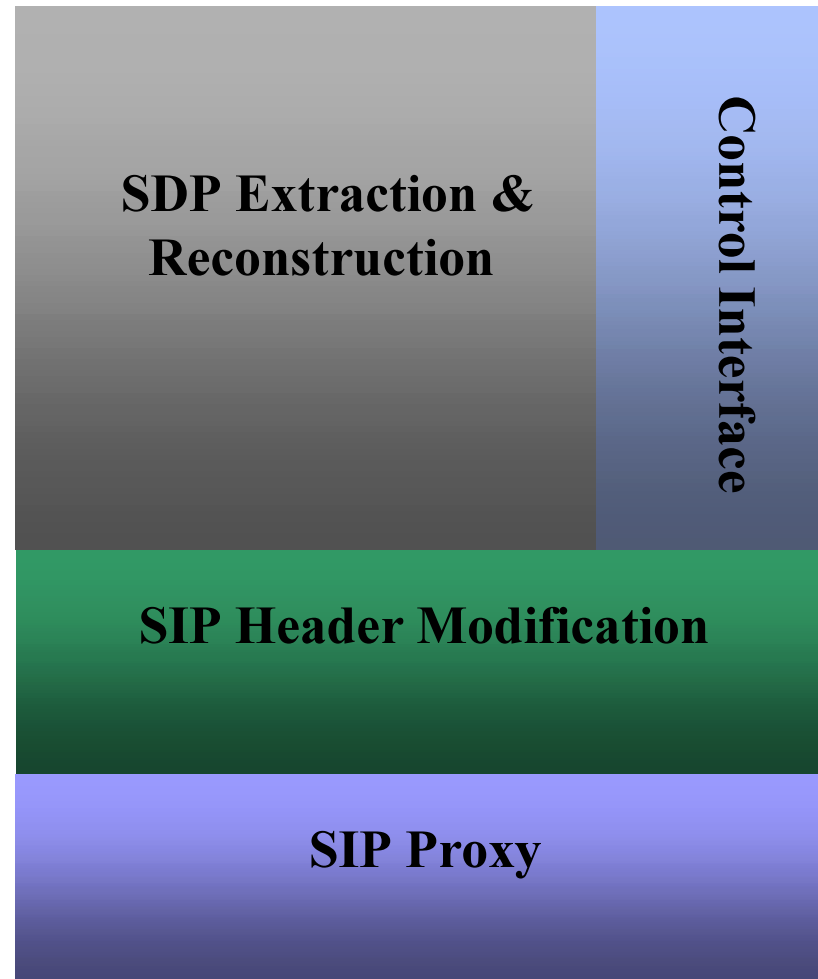
Media Translator

- Move UDP packets between IPv4 and IPv6 sockets
- Create/destroy the necessary ports for RTP and RTCP
- Interact with the SIP proxy
- Administrate connection-timers for soft state



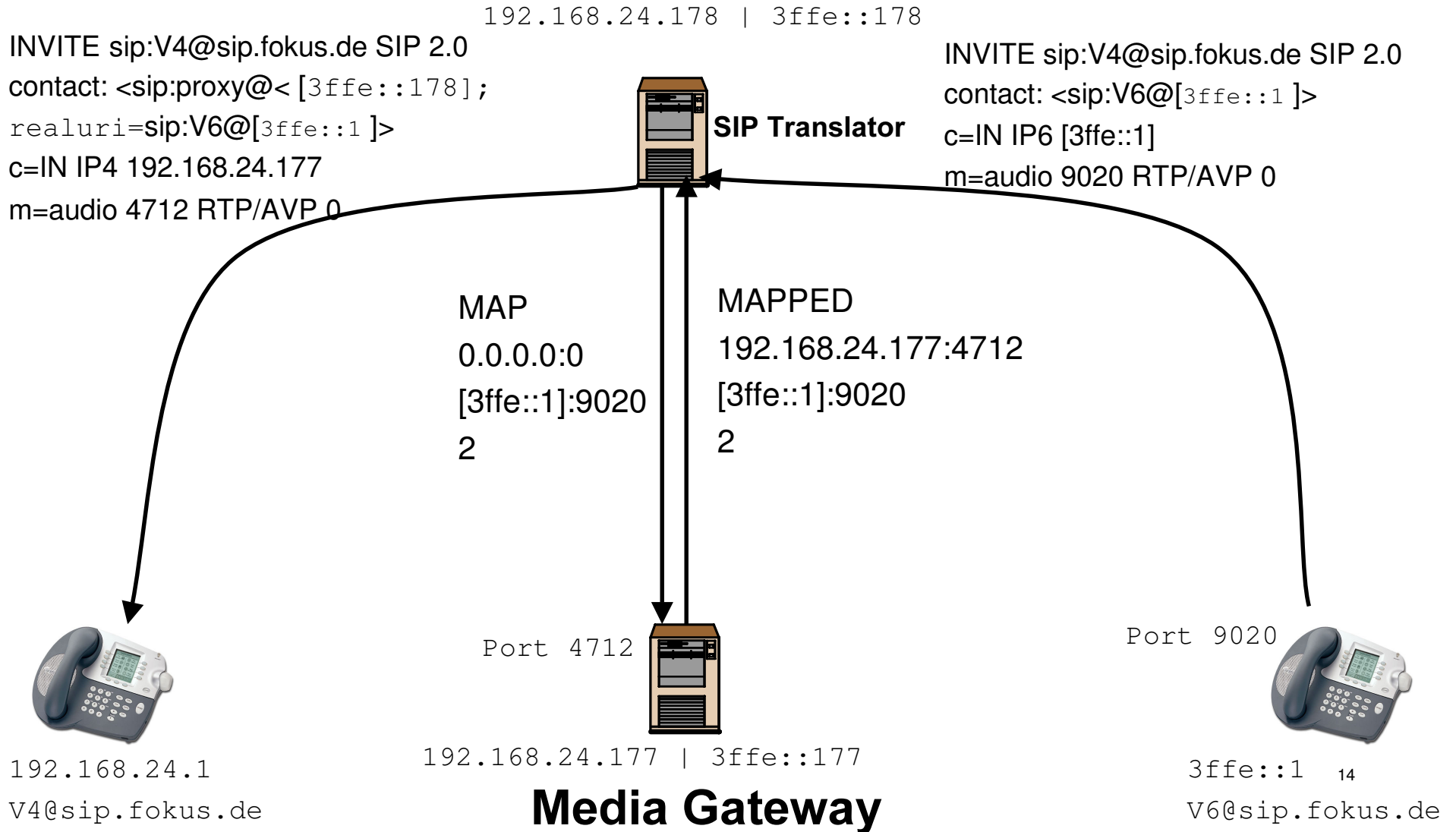
SIP Interprotocol Proxy

- Alter SIP headers
 - Adapt To, From, R-URI, Via, Record Route, Route
 - Adapt addresses in the SDP body
- Alter SDP parts (o, m, c)
- Proxy SIP messages
- Interaction with the media translator :
 - realized with UDP messages
 - send map requests with terminal address & port
 - receive map result with proxy address & port in other protocol family



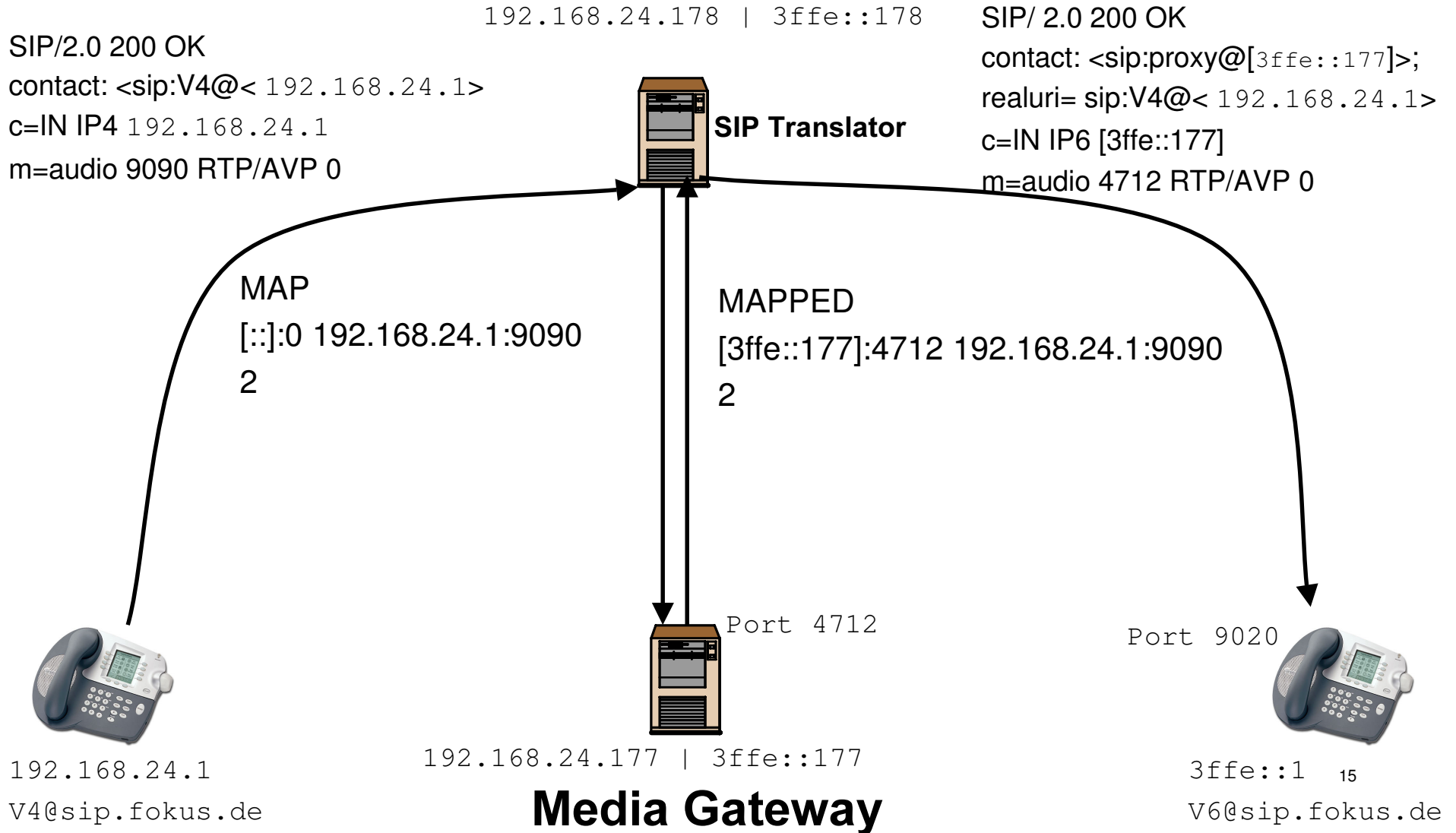


The Mapping Process



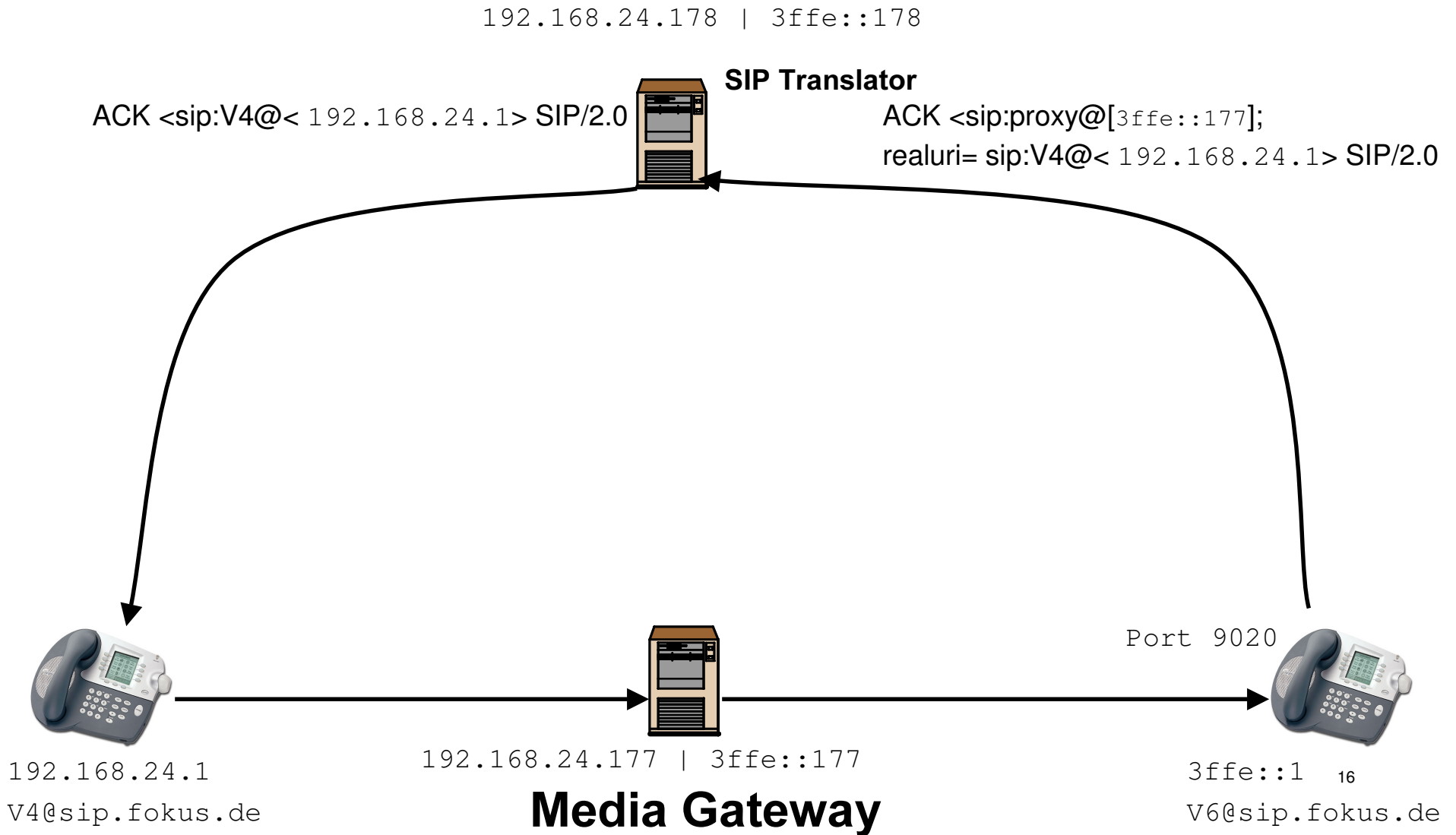


The Mapping Process





The Mapping Process





Final Words

- First implementation ready and available from
iptel.org

www.iptel.org

- Demo IPv6 capable UA available as well
- Work supported by Deutsche Telekom and further developed and to be deployed in European IPv6 network (6NET)

Thanks. Questions?