

A Peer-to-Peer SIP System based on Service-Aware Transport Overlays_

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Background

- Peer-to-Peer systems are seen as a threat
 - for operator business models (e.g., loss of revenue)
 - for other business (e.g., music/video business)
 - network infrastructure (e.g., “high” bandwidth consumption)
- Peer-to-Peer is also successful (some examples)
 - Skype for voice/video telephony
 - Joost/Zattoo for IPTV distribution
- Peer-to-Peer and overlay networks are useful
 - Off-loading load from centralized entities
 - Hiding complexity of underlying network
 - Allowing new services on top of (old) infrastructure
- Adding Peer-to-Peer to future network architecture
 - Making peer-to-peer integral part
 - Operator assisted P2P-network operation
 - Enables network customization for individual services (through virtualization of the underlying network)

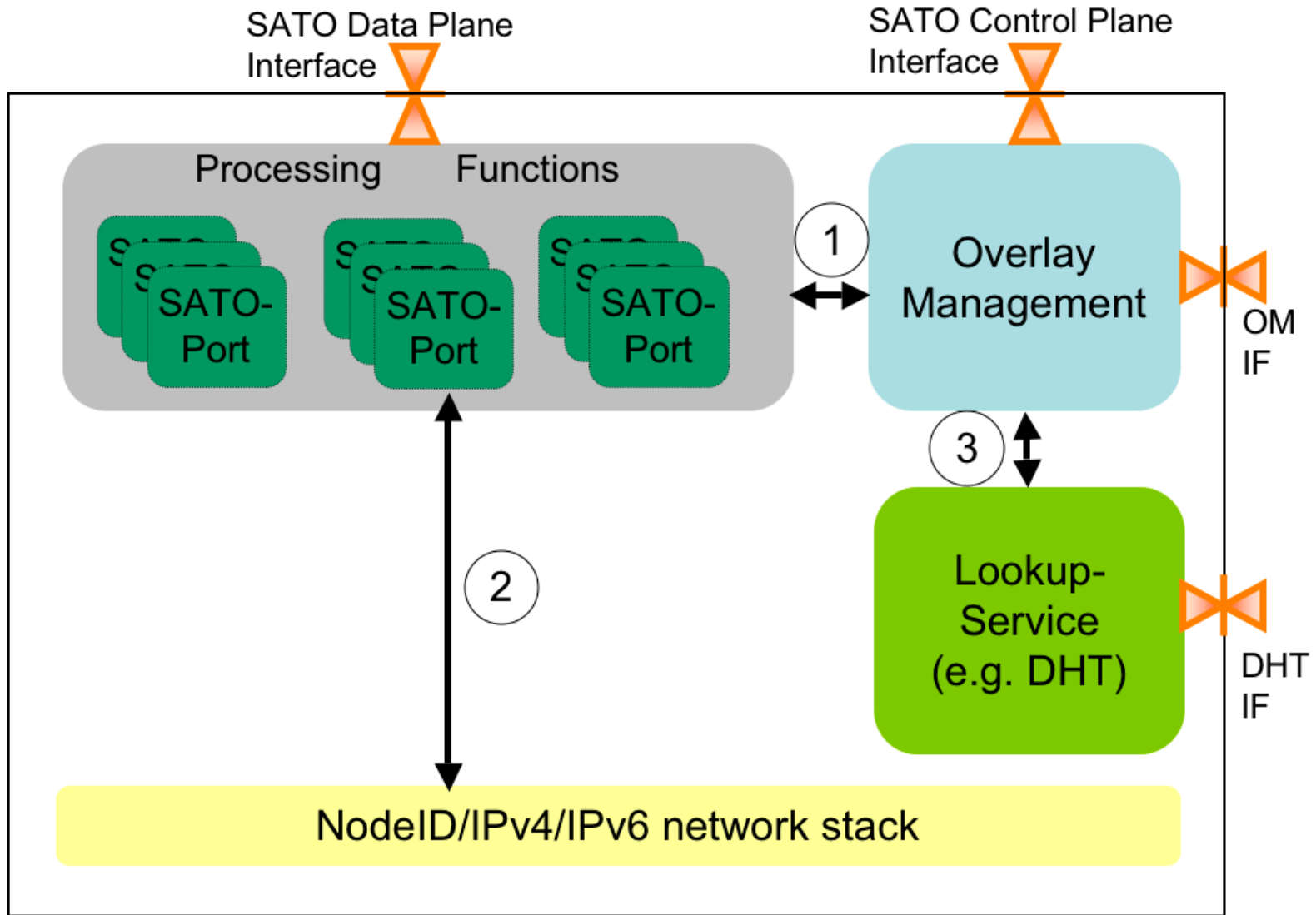
P2PSIP Goals

- Generic peer-to-peer and transport overlay system
 - usable for multiple applications
 - today systems are typically bound to certain usage
 - peer-to-peer: decentralized lookup service and direct data exchange
 - transport overlay: overlay on top of infrastructure providing more than a tunnel
- Using decentralization to
 - get a bit more independent of centralized servers
 - get new “services”
 - probably save costs (less servers – might be true or not)
- Peer-to-Peer under extreme conditions
 - extreme conditions: network failure, natural disaster
 - current centralized server approach not workable
 - current peer-to-peer approaches not workable
 - they all need the “Internet”
 - Peer-to-Peer should allow operations under such extreme conditions
- Operator involvement
 - getting network feedback and support
 - should have an incentive for operators (e.g., trust anchor)

SATO in a Nutshell

- Result of Ambient Networks R&D project
- Provide flexible and customizable Overlay Network layer
 - Service-aware Transport Overlay (SATO)
 - Dynamic inclusion of network processing elements (SATO Ports)
 - On-demand Overlay per service set up and tear down
 - Dynamic adaptation to changes (network, context, etc.)
- Service paths composed by Overlay Nodes (ONodes)
 - SATO controller (Overlay Manager)
 - Hosting one or more SATO Ports (SPs)
 - Additional elements for communication, resources mngt, etc.
- Generalized lookup service
 - API to (distributed) database
 - Using DHT
- Provide generic overlay system for applications, e.g.,
 - IPTV
 - Peer-to-Peer SIP

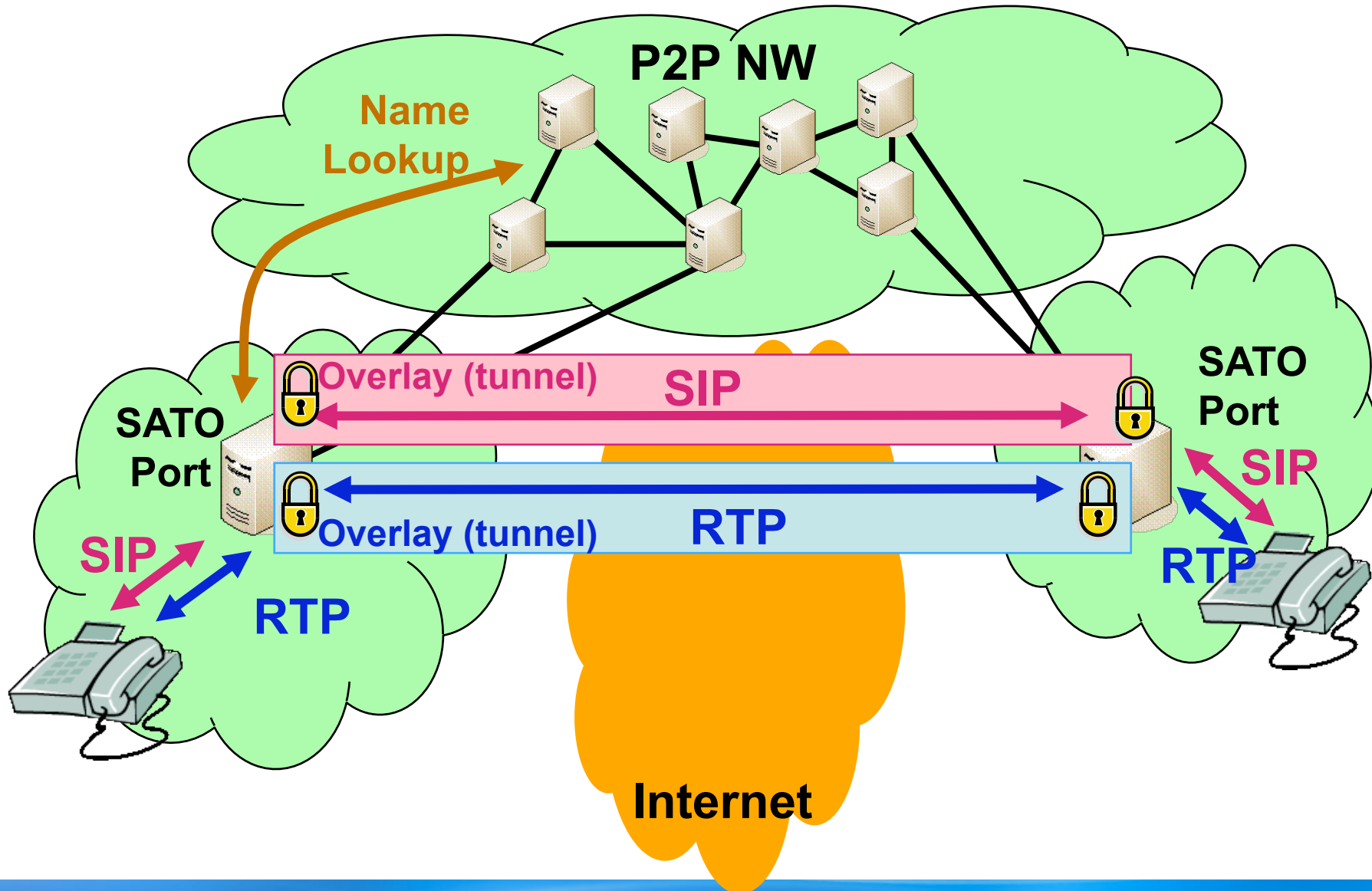
SATO Node Architecture



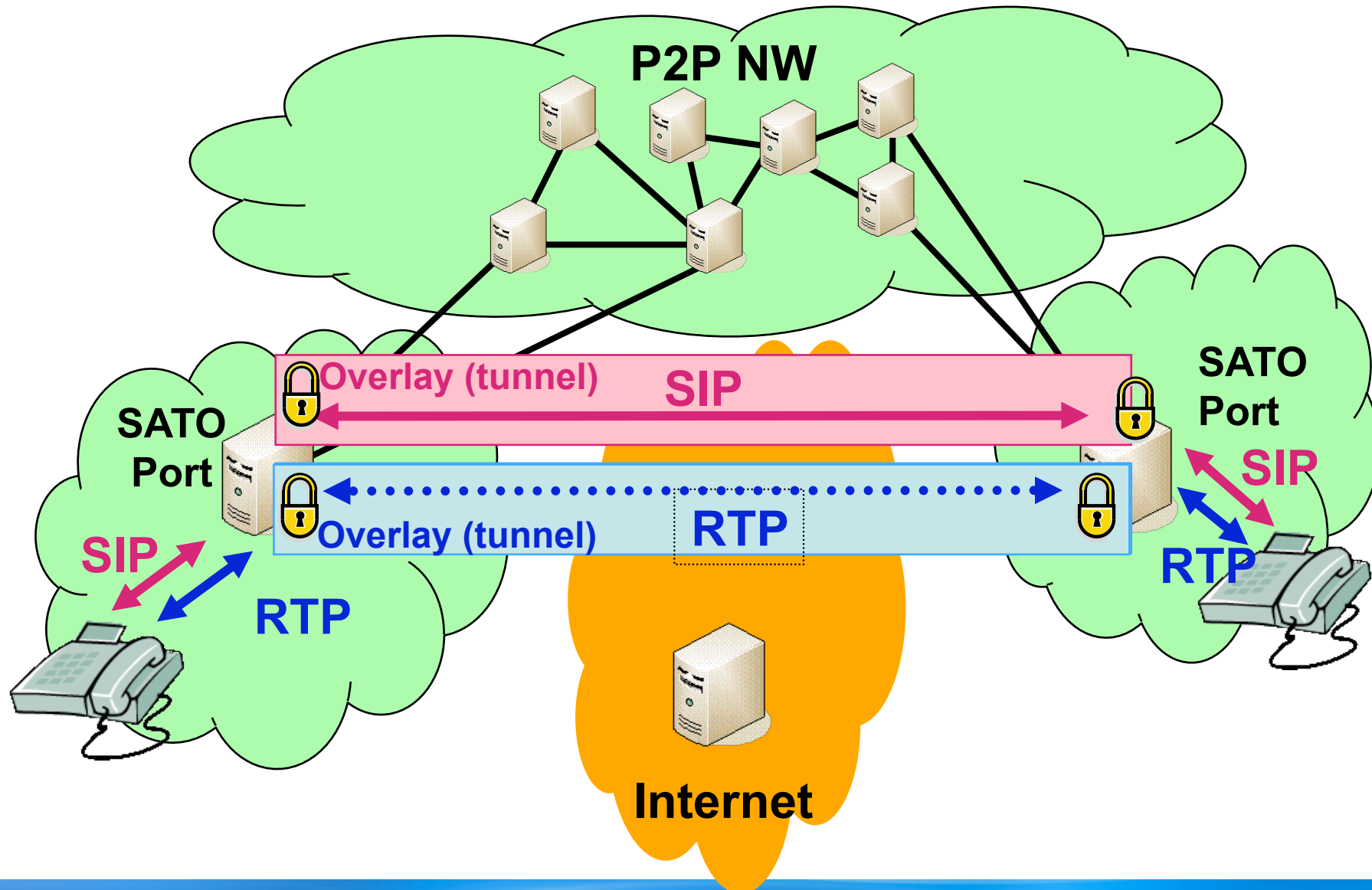
P2PSIP as SATO Usage Example



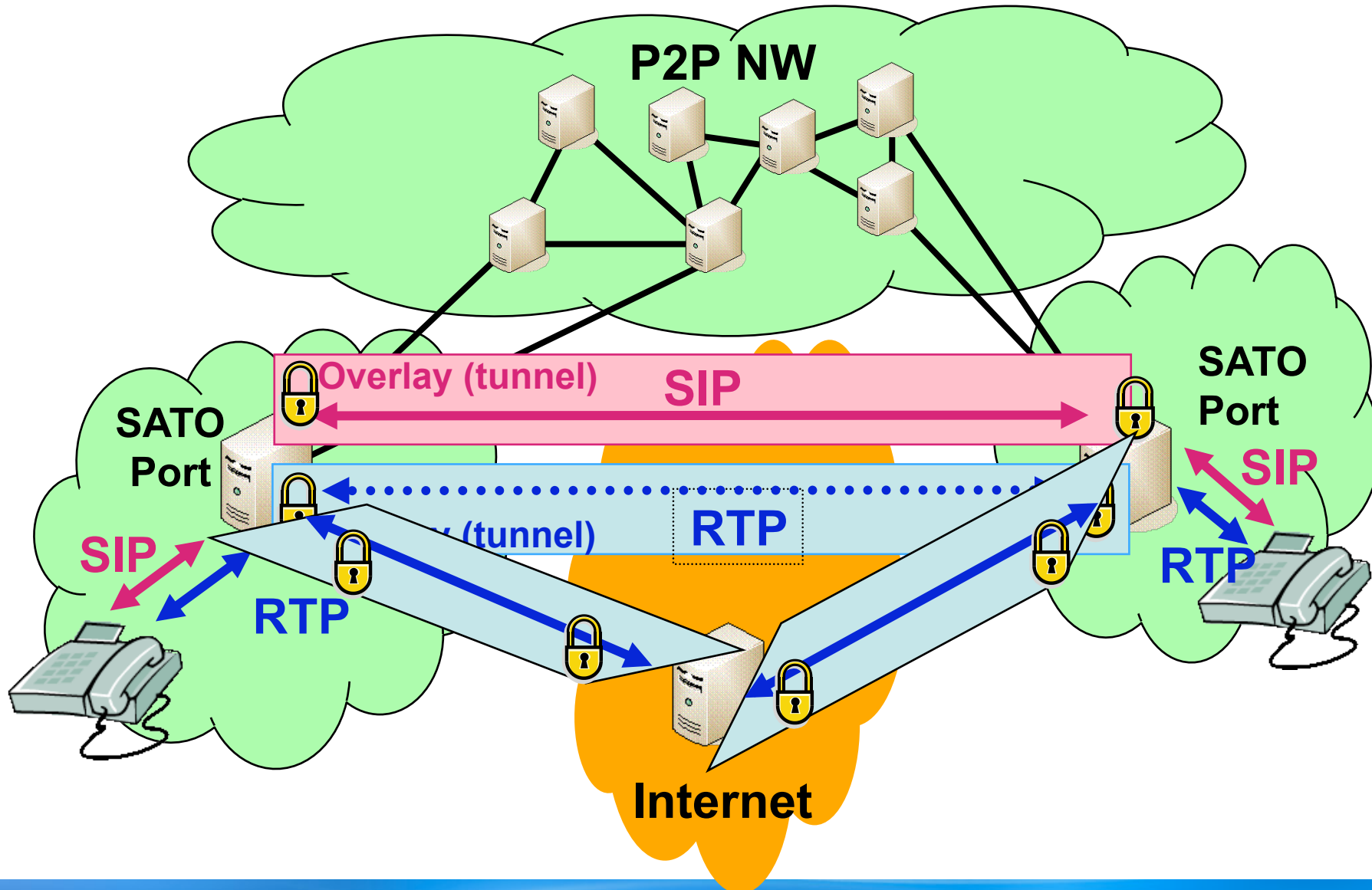
P2PSIP SATO



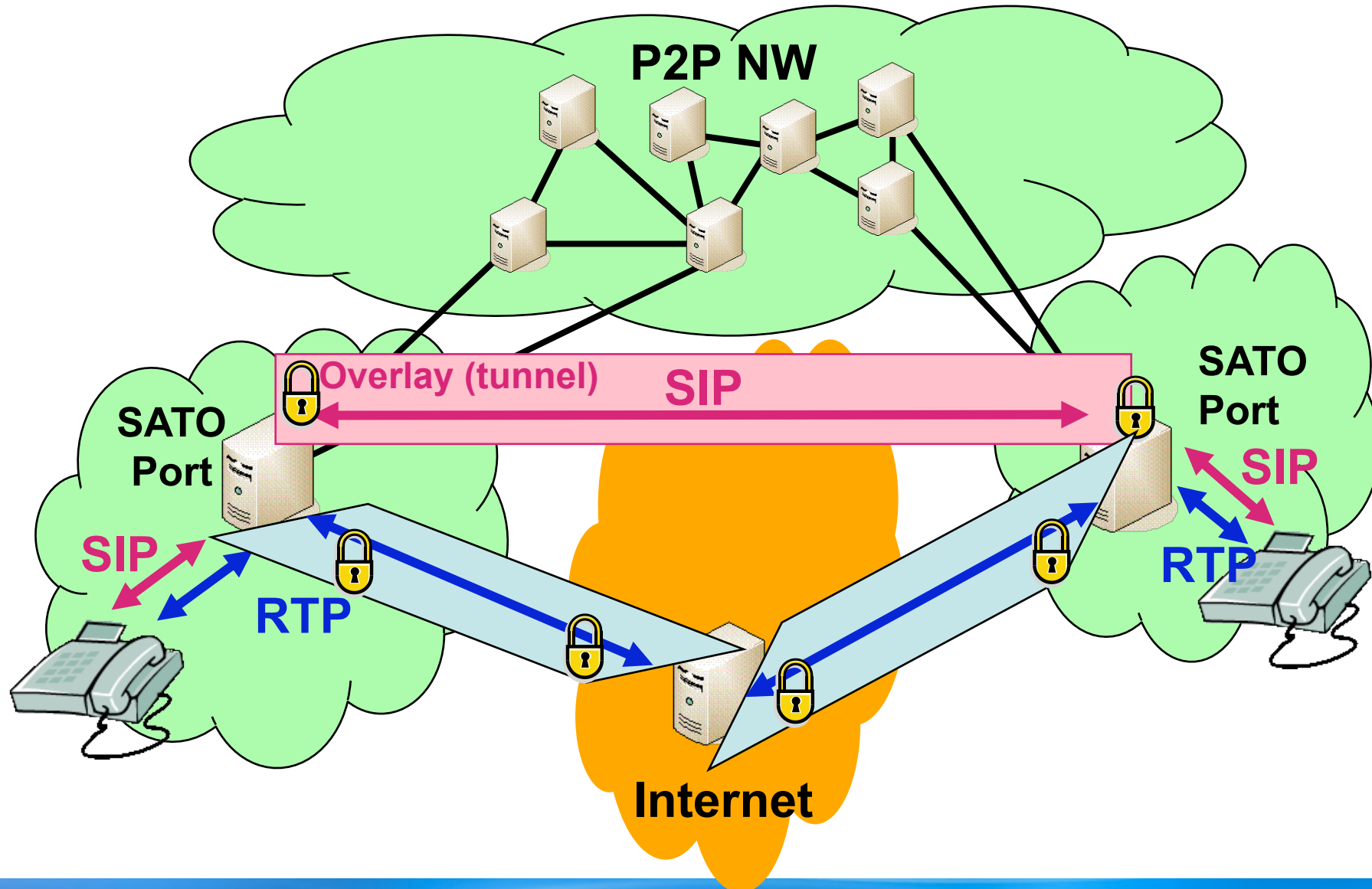
P2P Overlay Adaptation



P2P Overlay Adaptation



P2P Overlay Adaptation



P2P Conclusions

- SATO system specification is completed
- Prototype implementation ready for P2PSIP and IPTV
- P2PSIP
 - Slightly different from IETF approach
 - Enables SIP to run without SIP server
 - Adds security to SIP on all levels
 - Makes SIP resilient to network changes
 - No changes to SIP standard required
 - No changes to SIP terminals required
- Open issues
 - Operator assisted P2P-network operation
 - future P2PSIP services can require operator assistance and benefit from that
 - How difficult is the step to a be service provider
 - Research, e.g., integration with Internet architecture
 - Is DHT the right answer to large-scale distributed lookup services?

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