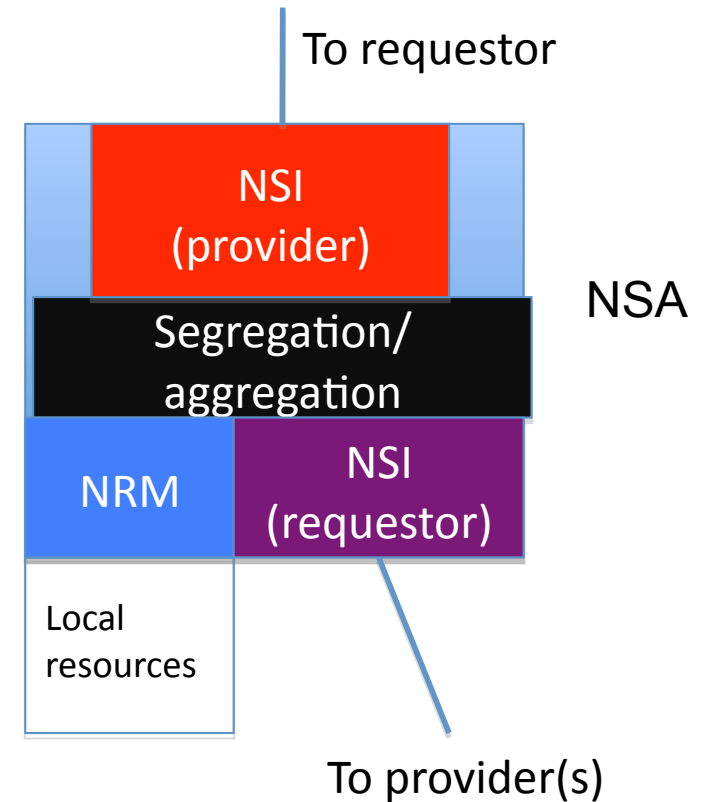# NSI/NML Resource and Topology Issues

OGF Munich

March 2010

NSI Network Concepts

- In NSI every transport resource is owned by one and only one an NRM (Network Resource Manager)
- An NRM is embedded in one and only one NSA (Network Service Agent)
- An NSA may manage additional resources by using an NSI Requestor interface to make requests to other NSAs

•NSI Concepts

- Set of resources managed by an NSA is called a network in NSI (a group owned by an NSA in NML talk)
- A network consists of all resources managed by an NSA (Network Service Agent)
- An Atomic Network is a network managed by an NRM
  – Atomic in the sense that resources cannot be divided among other networks
- Some extensions of this
  – A Network is a set of one or more Atomic networks
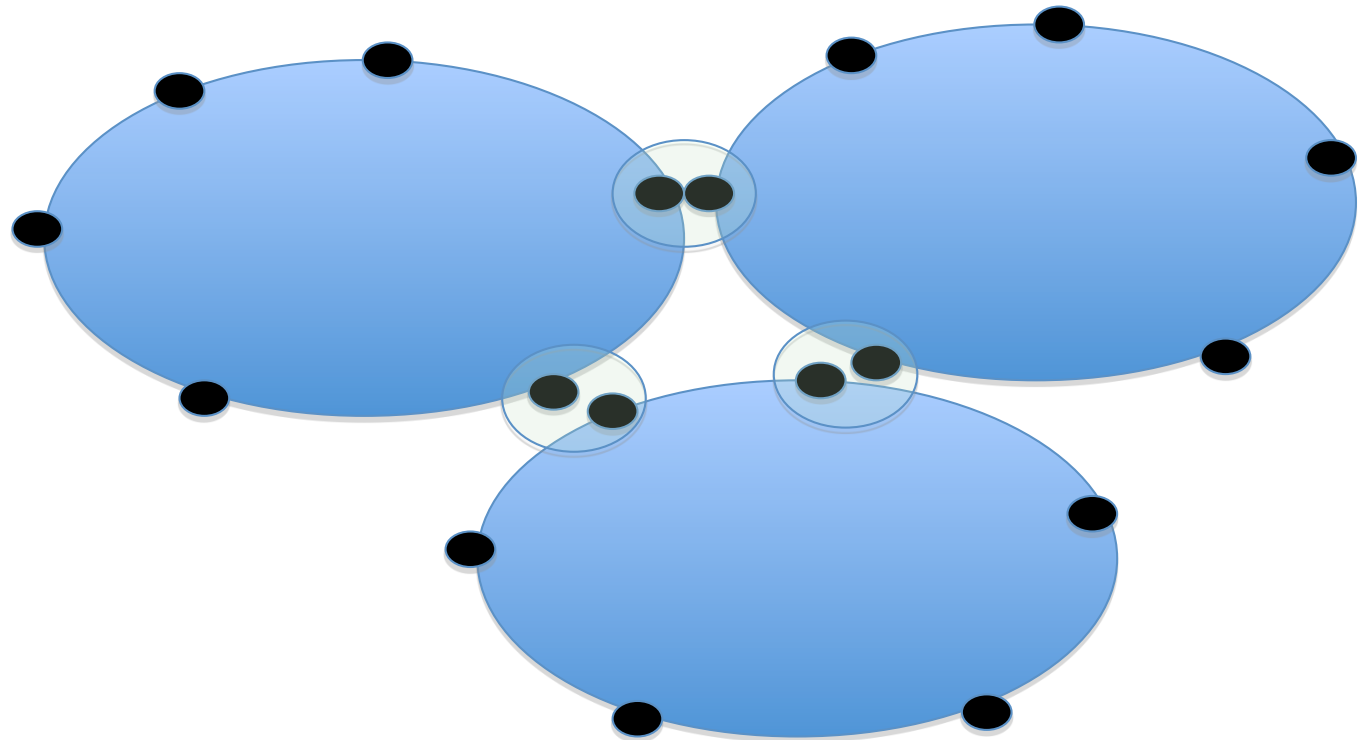 – An network can be in multiple other networks

NS transport capability

- Network is the basic abstract transport resource presented to the outside

- Provider NSA schedules, reserves, and instantiates a connection between network ports on a network

- Network Ports are places where a network can attach to another network or to an end system's transport
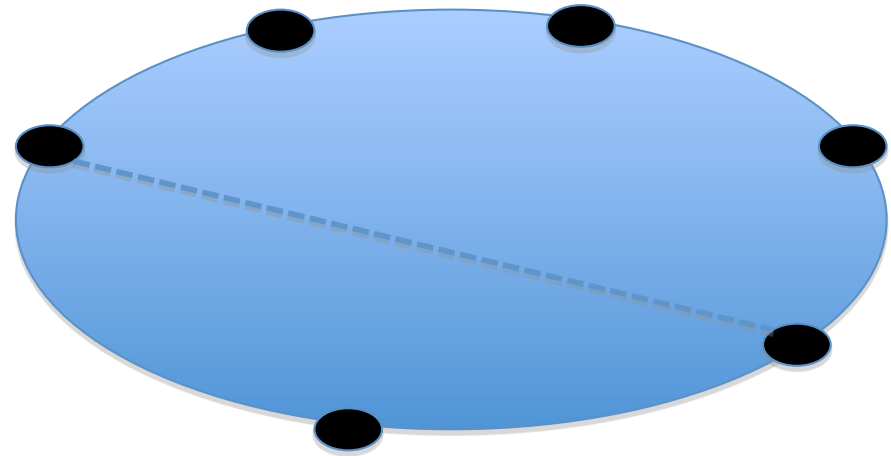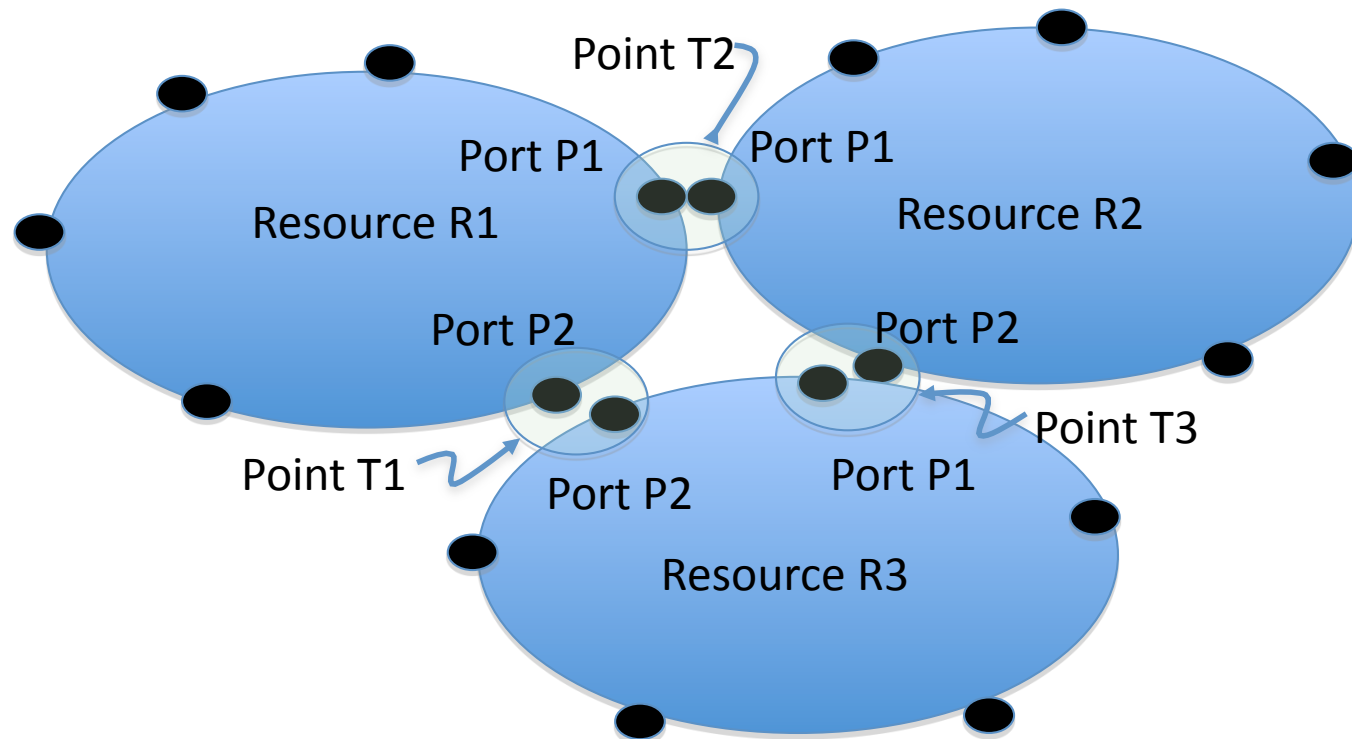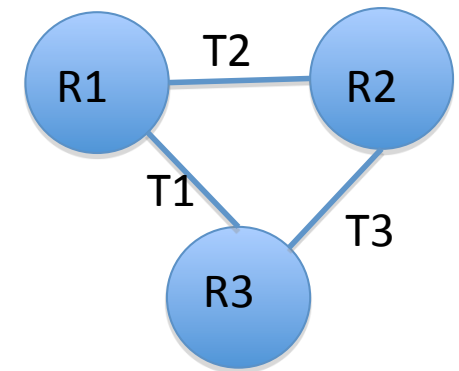
Connecting Networks

- Networks connect to other networks by joining ports at a topological point

- I call this a Network Point (so far)

Topology Graph for Interconnected Networks

Point T2

Port P1   Port P1

Resource R1   Resource R2

Port P2   Port P2

Point T1   Point T3

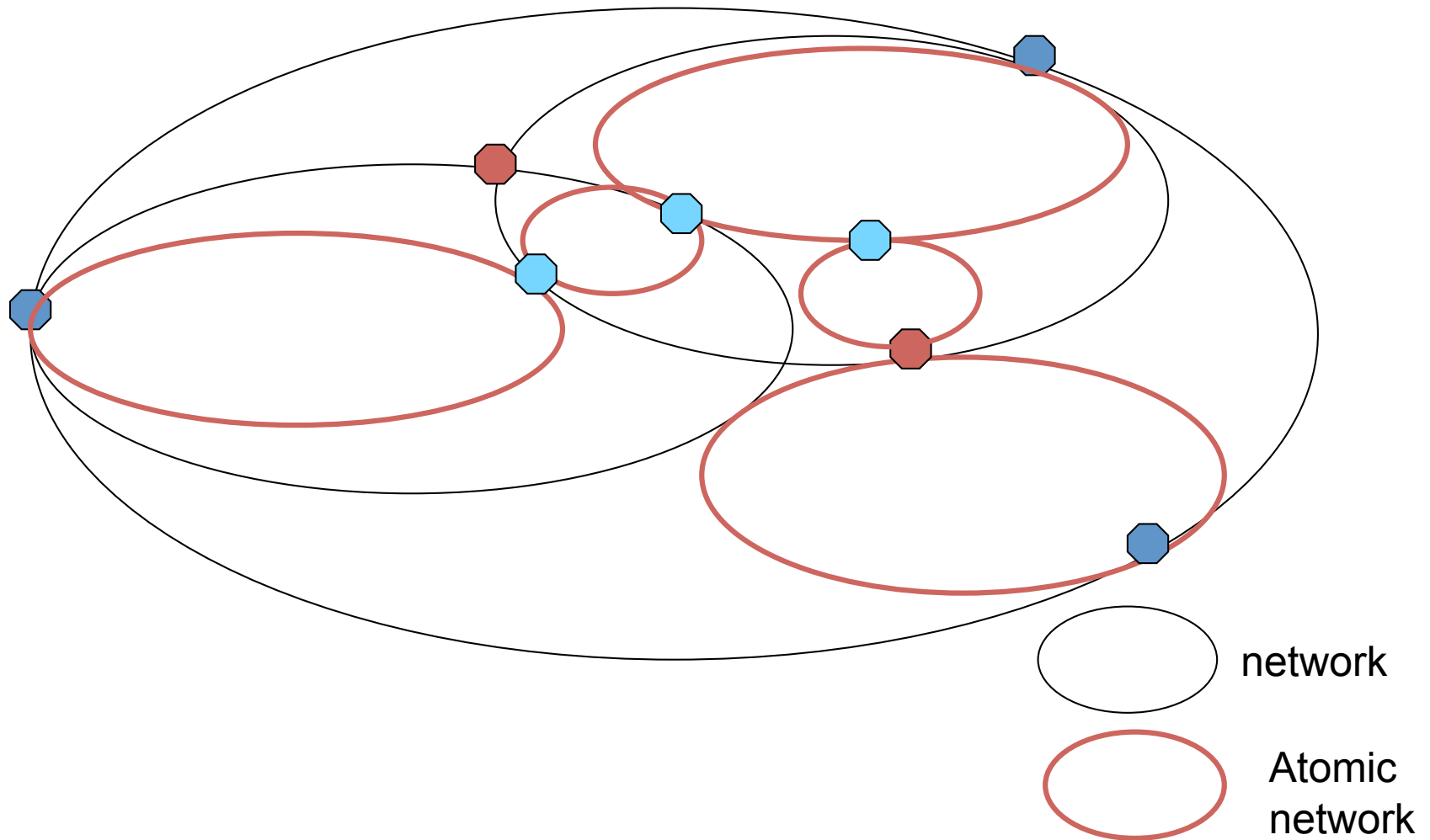Port P2   Port P1

Resource R3

$T_1 := \{R_1/P_2, R_3/P_2\};$
$T_2 := \{R_1/P_1, R_2/P_1\};$
$T_3 := \{R_2/P_2, R_3/P_1\};$

R1 — T2 — R2
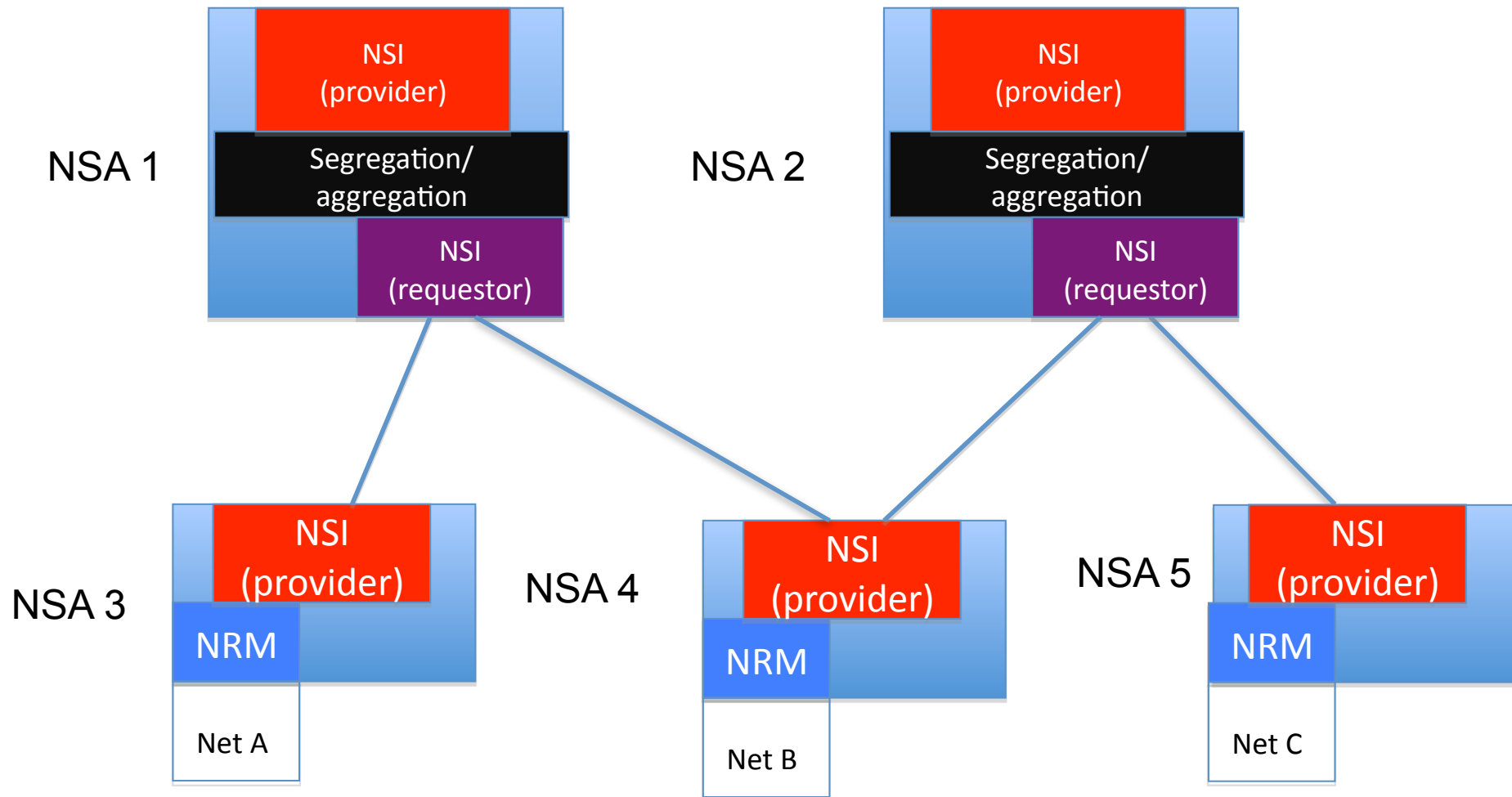
T1   T3

R3

Network
each network known by an NSA

network

Atomic
network

Atomic Network (Net B) in multiple networks

Network (N1) at NSA1 == [NetA, NetB]

Network (N2) at NSA2 == [NetB, NetC]

Question for NML

- NSI implies a topology of connected networks

- Networks connect (relate) directly to each other

- A Network is defined by which NSA can make connections across it

- Question is how to describe this topology

- (perhaps a next version of NML?)

- Topology seen from service plane is different from actual data plane topology so can NML provide a way a to describe this?

Topology requirements from NSI Requirements doc

[with a few edits for clarity]

- The model must describe a group of network resources that are owned or controlled by a single Provider NSA. (tentatively called network)
- The model must be able to describe a grouping of Networks (also a network)
- The model must be able to describe resources (ports/points) in a Network that are available for connecting to other Networks.
- Network Ports must be able to be assigned to the end of a either a link or node that is internal to the network
- The model must be able to describe an arbitrary number of layers of logical ports within a Network Port.
- The model must be able to describe connectivity between Networks.
- The resources that attached to Network Points must have ownership by a clearly identifiable provider
- The model must allow policy to be assigned at network and port level