Service Protection over External Interfaces (UNIs and E-NNIs)

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Goals

The purpose of this presentation is to:

- Align the mechanism providing service protection between adjacent networks (explained in the presentations listed below) with the recently proposed framework (presented in January 2010). In this presentation, the original mechanism is referred to as Inter Network Service Protection – ***INSP*** – while the proposed concept is referred to as the ***NNI framework*** .
- Highlight the principle of operations for the aligned INSP mechanism.
- Present and discuss the points for consideration.

Previous presentations on this issue can be found as follows:

- Inter Network Service Protection (INSP) – problem statement and proposed solution:
  1. http://www.ieee802.org/1/files/public/docs2009/new-alon-service-protection-in-interconnectned-areas-0509-v01.ppt
  2. http://www.ieee802.org/1/files/public/docs2009/new-alon-UNI-ENNI-protection-09-09-v01.ppt
  3. http://www.ieee802.org/1/files/public/docs2009/new-sprecher-UNI-ENNI-protection-update-1109-v01.pdf
  4. http://www.ieee802.org/1/files/public/docs2010/new-alon-UNI-ENNI-protection-requirements-0110-v01.pdf
  5. http://www.ieee802.org/1/files/public/docs2010/new-alon-UNI-ENNI-protection-technical-issues-0110-v01.pdf
- Protection aspects and considerations:
  1. http://www.ieee802.org/1/files/public/docs2009/new-parsons-protection-1109.pdf
  2. http://www.ieee802.org/1/files/public/docs2010/new-seaman-nni-thoughts-1109-02.pdf
  3. http://www.ieee802.org/1/files/public/docs2010/new-haddock-ENNI-redundancy-1109-v1.pdf
  4. http://www.ieee802.org/1/files/public/docs2010/new-vinod-ENNI-Protection-0110-v01.pptx
- NNI framework
  1. http://www.ieee802.org/1/files/public/docs2009/new-nfinn-nni-framework-0110-v01.pdf

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Updates to the INSP Mechanism

The following aspects of the INSP mechanism were adjusted and aligned with the proposed NNI framework:

- Adopted some of the terminology from the framework proposal (NNI, portal)
- Included support for more than two nodes in each network and more than two links connecting the adjacent networks in each node
- Eliminated the following terms: control nodes, slave nodes, working and protection ports. Priorities are used instead of the former terms.

Terms & Definitions

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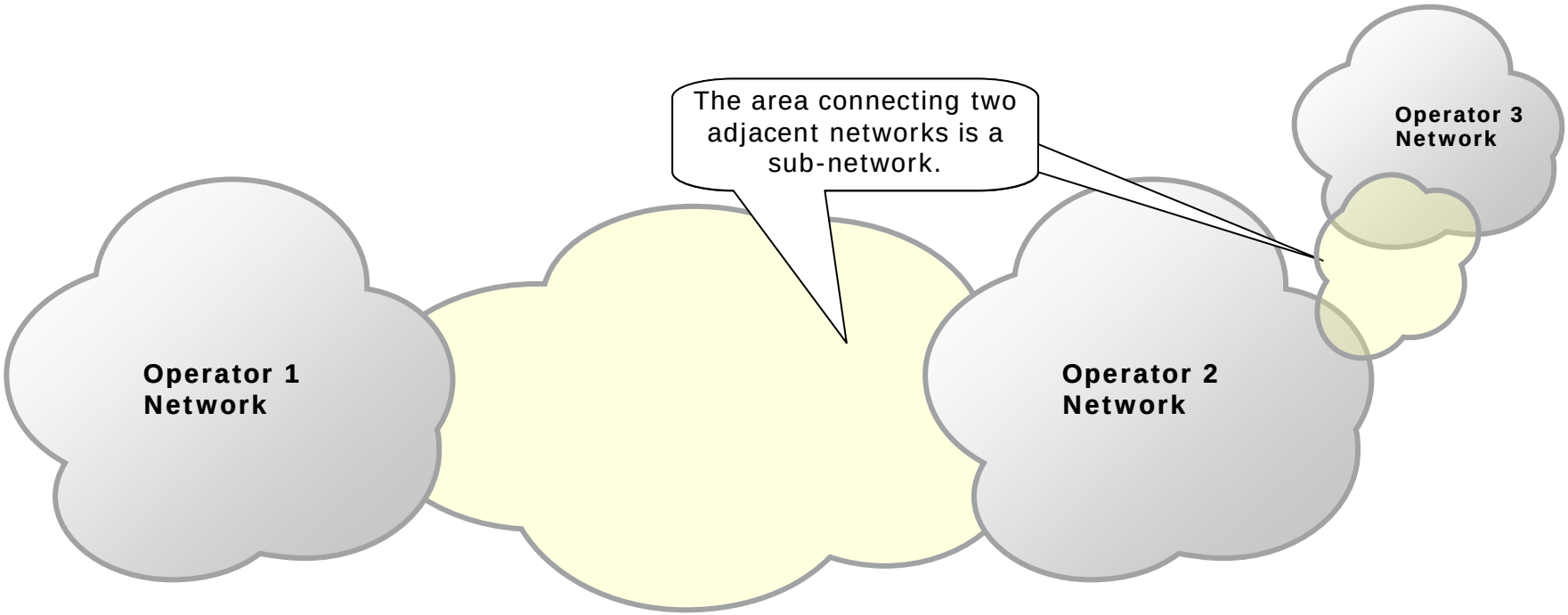
Terms & Definitions
NNI



INSP	NNI-Framework	Preferred Term
Interconnected zone	NNI	NNI

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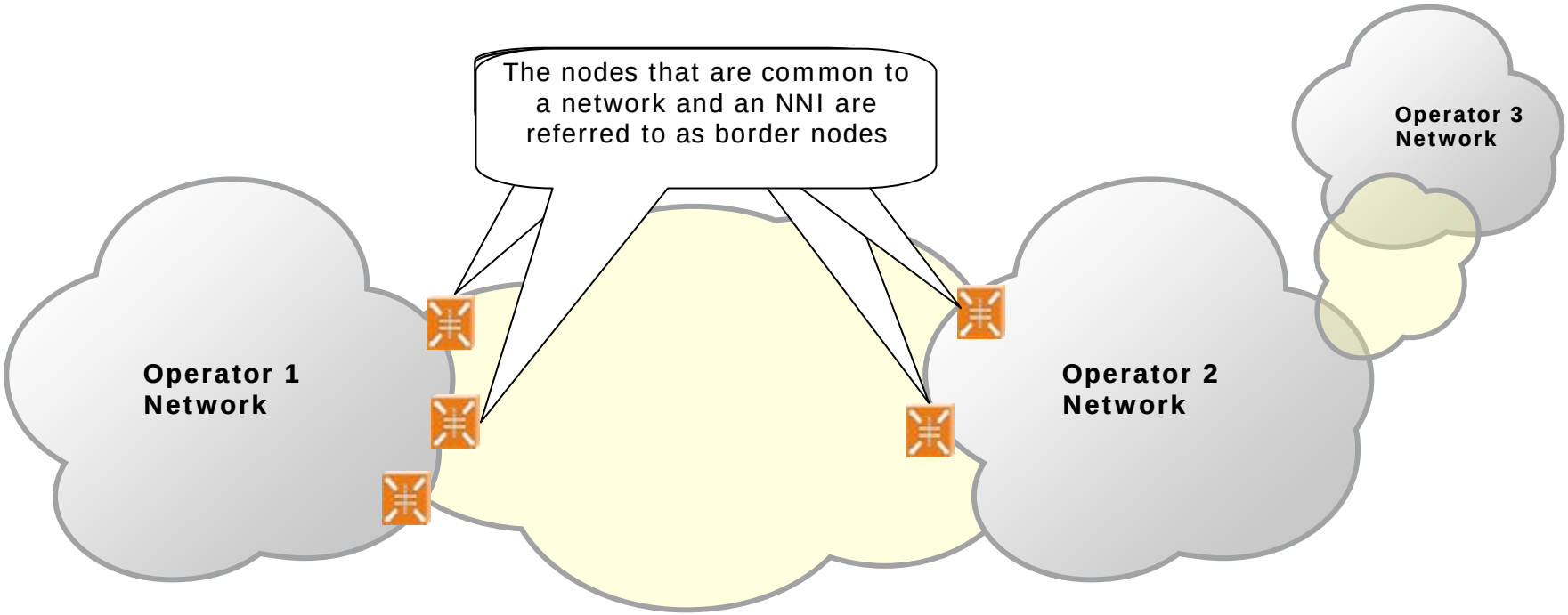
Terms & Definitions
Border Nodes



INSP	NNI-Framework	Preferred Term
Nodes (One or two)	Nodes (Any number)	Border Nodes (Any number)

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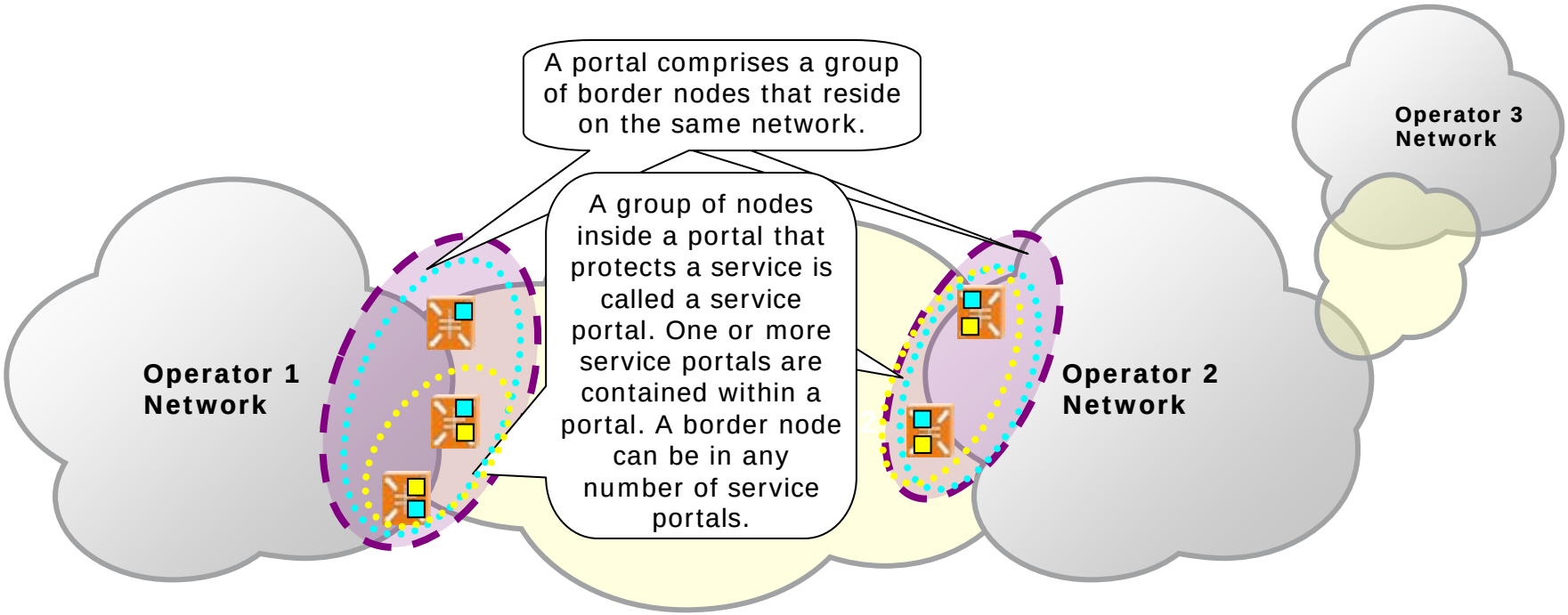
Terms & Definitions
Portal & Service Portal



INSP	NNI-Framework	Preferred Term
----------	Portal	Portal / Service Portal

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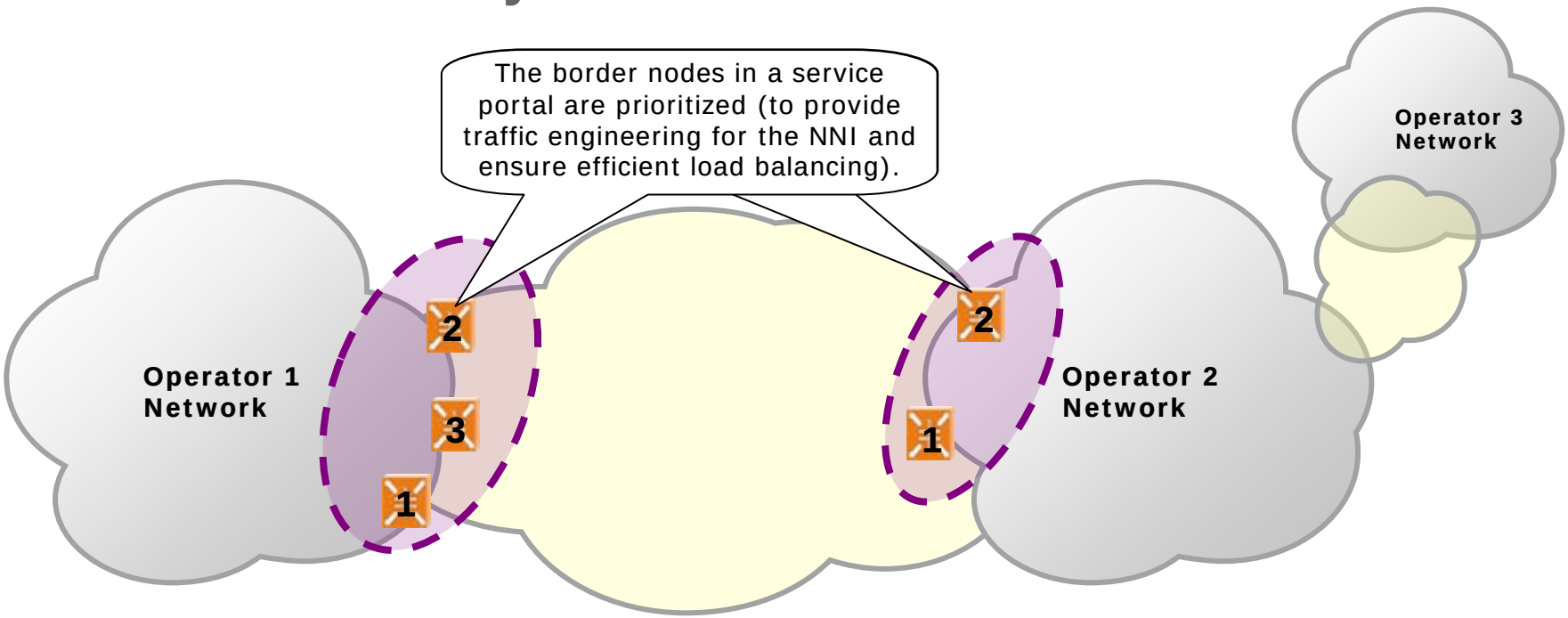
Terms & Definitions
Border Node Priority



INSP	NNI-Framework	Preferred Term
Master / Deputy / Slave	----------	Border Node Priority

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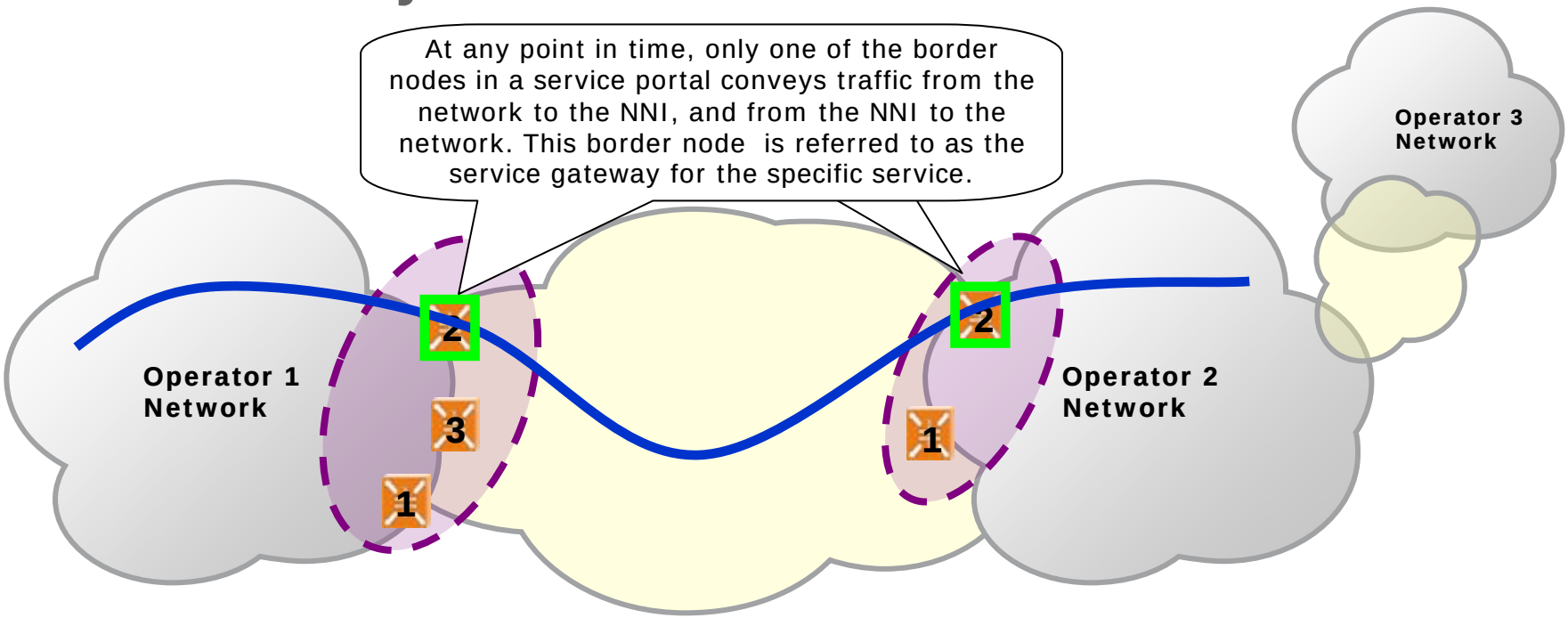
Terms & Definitions
Service Gateway



INSP	NNI-Framework	Preferred Term
Traffic Gateway	Terminus	Service Gateway

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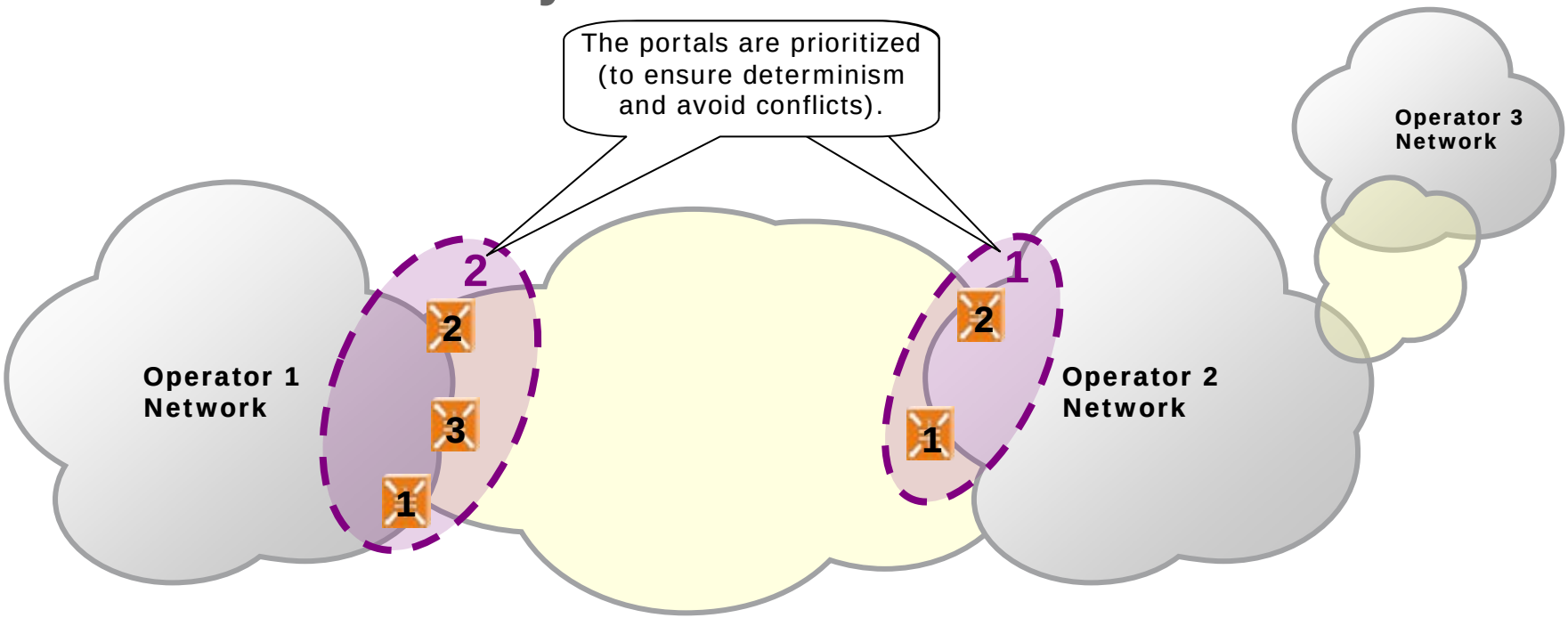
Terms & Definitions
Service Portal Priority



INSP	NNI-Framework	Preferred Term
Control nodes / Slave nodes	----------	Service Portal Priority

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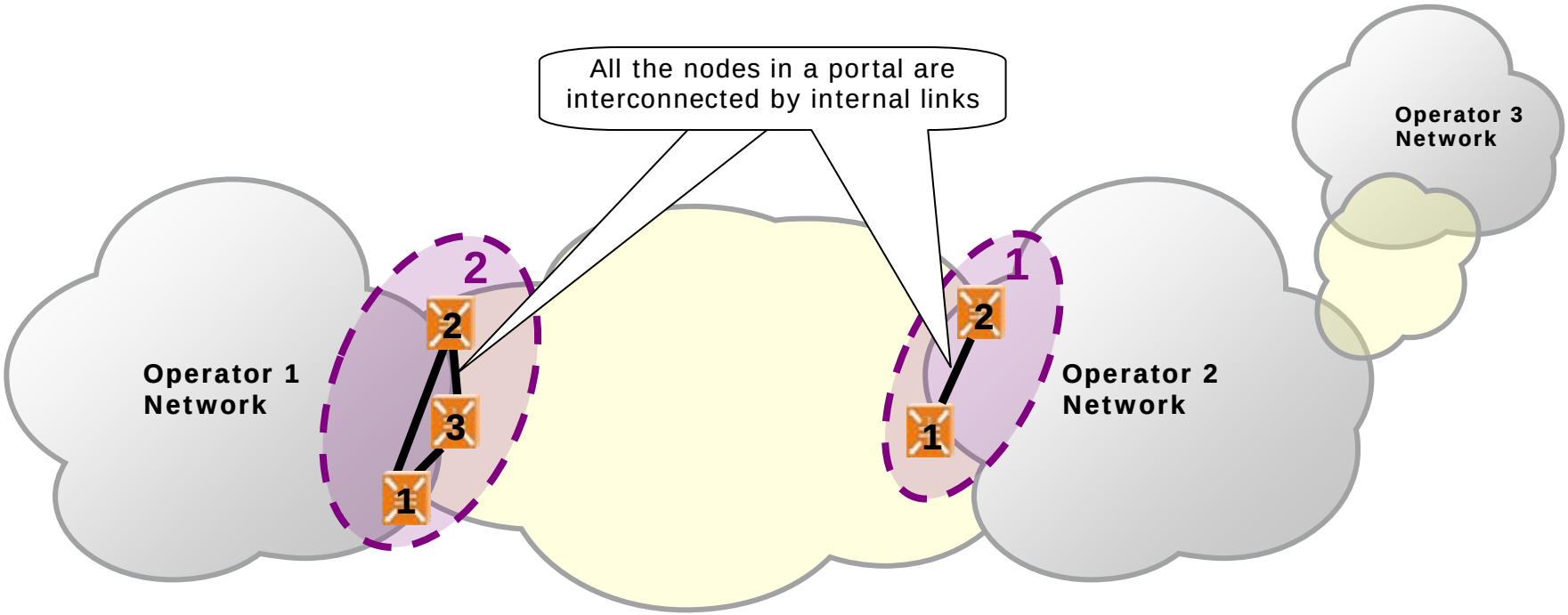
Terms & Definitions
Internal Links



INSP	NNI-Framework	Preferred Term
Internal link (optional)	Intra-cloud link	Internal Link

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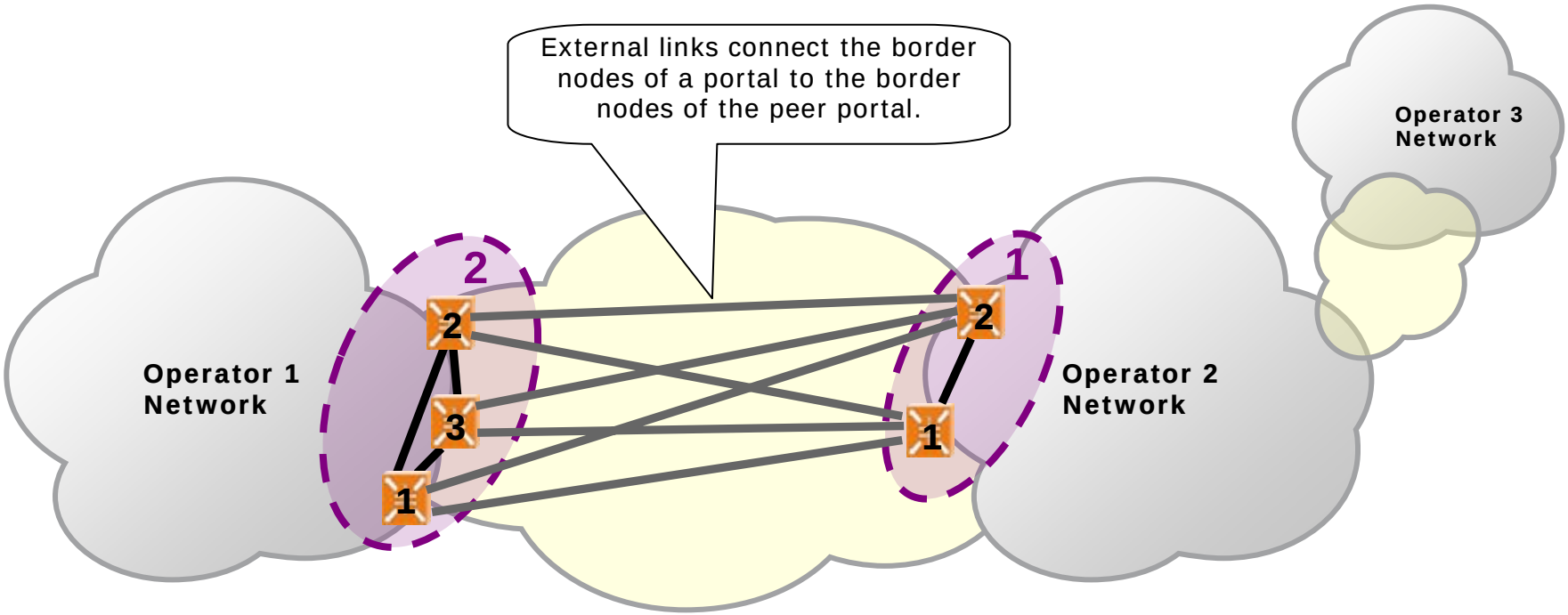
Terms & Definitions
External Links



INSP	NNI-Framework	Preferred Term
---------- (Connected to all peer border nodes)	Between cloud link	External link

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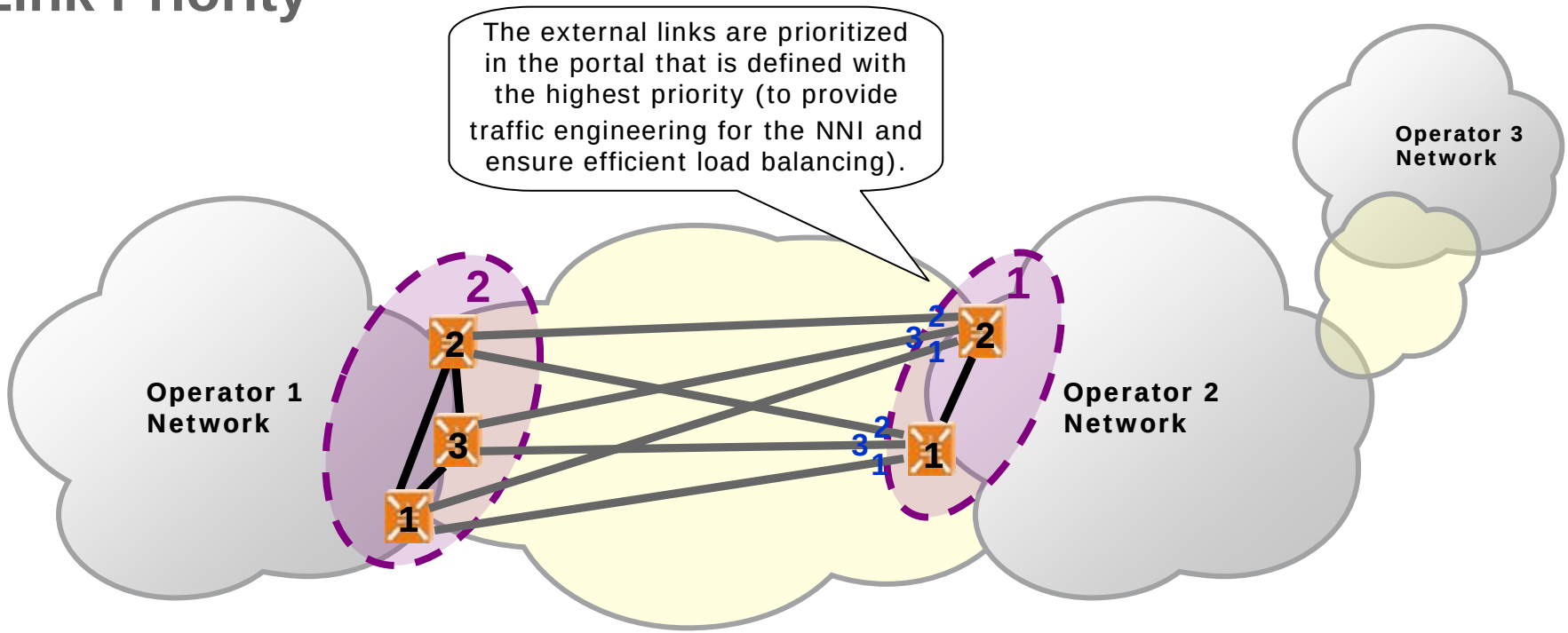
Terms & Definitions
Link Priority



INSP	NNI-Framework	Preferred Term
Working / Protection	----------	Link Priority

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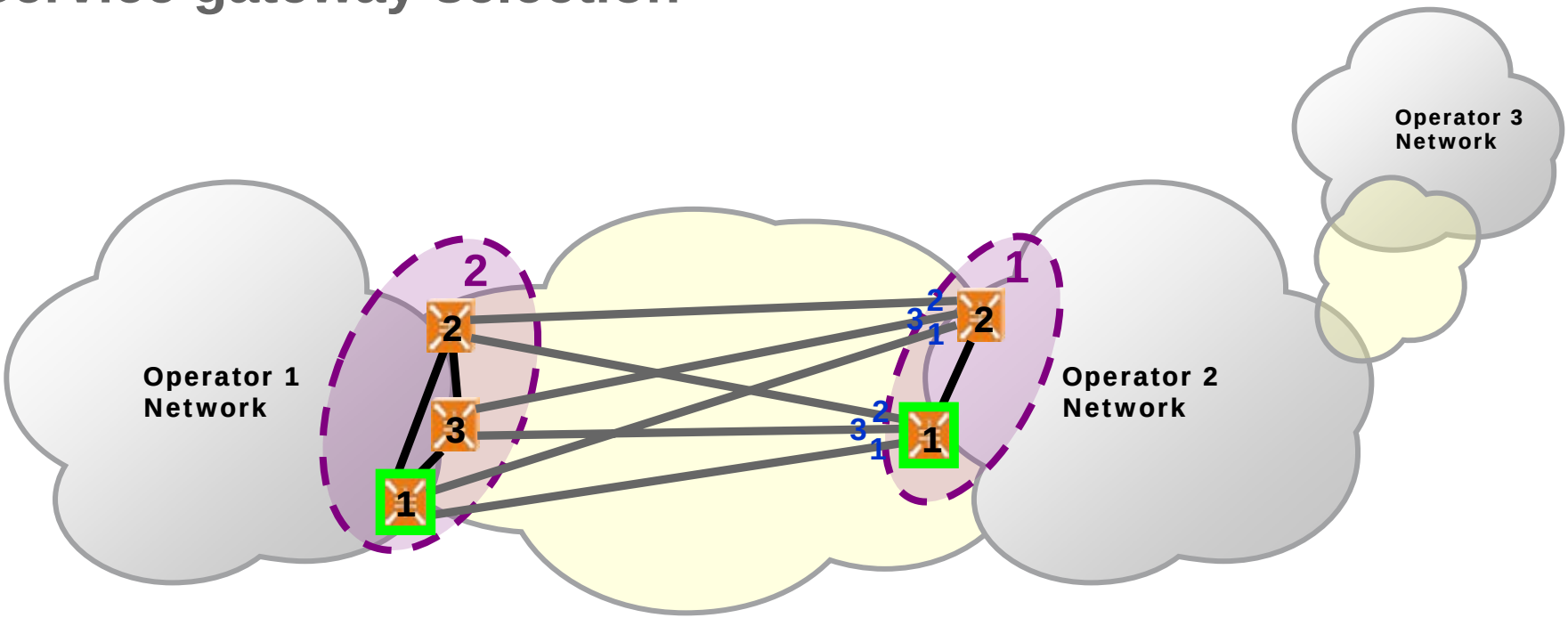
Terms & Definitions - Summary

INSP	NNI-Framework	Proposed
Interconnected zone	NNI	NNI
----------	Node	Border Node
----------	Portal	Portal
Master / Deputy / Slave	----------	Border Node Priority
Traffic Gateway	Terminus	Service Gateway
Control nodes / Slave nodes	----------	Service Portal Priority
Internal link	Intra-cloud link	Internal link
----------	Between cloud link	External link
Working / Protection	----------	Link Priority

Principles of operation

Principles of Operation
Service gateway selection



INSP	NNI-Framework	Proposed
Only the control node portal selects a service gateway (according to the master/slave configuration); The control node service gateway determines the service gateway in the slave node portal.	Each portal selects a terminus according to its own routing protocol.	Each portal selects a service gateway according to priority.

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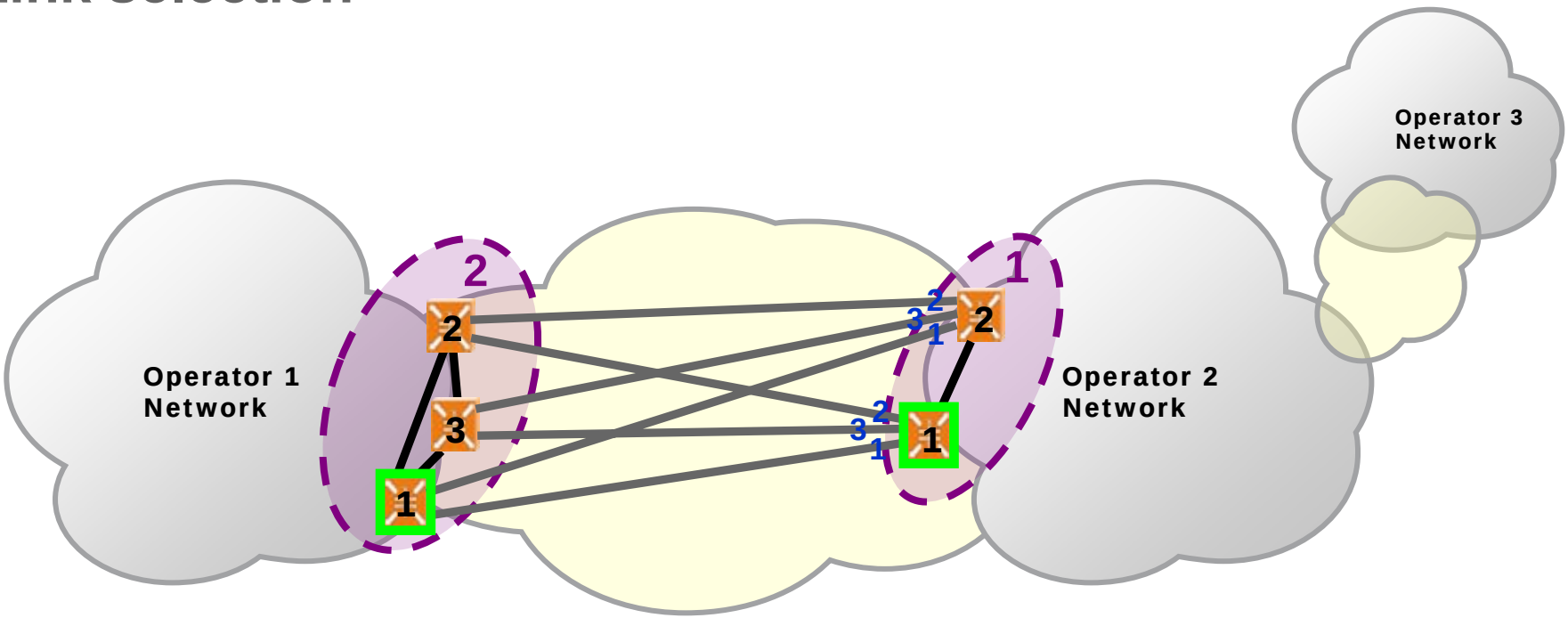
Principles of Operation
Link selection



INSP	NNI-Framework	Proposed
The service gateway in the control node portal selects a link for conveying traffic. If a link exists which is connected to the peer service gateway, this specific link is selected.	NNI standard protocol running between the portals	The service gateway belonging to the portal defined with the highest priority selects the link for conveying traffic. If a link exists which is connected to the peer service gateway, this specific link is selected.

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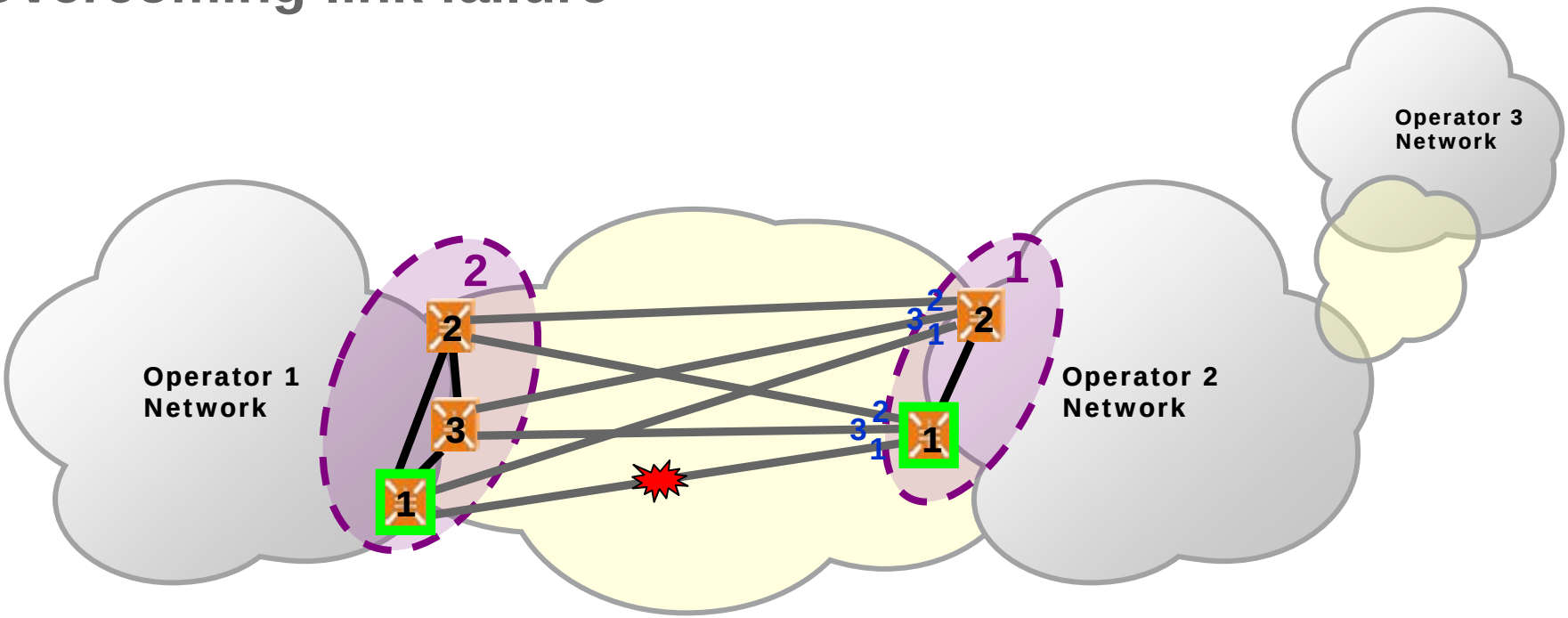
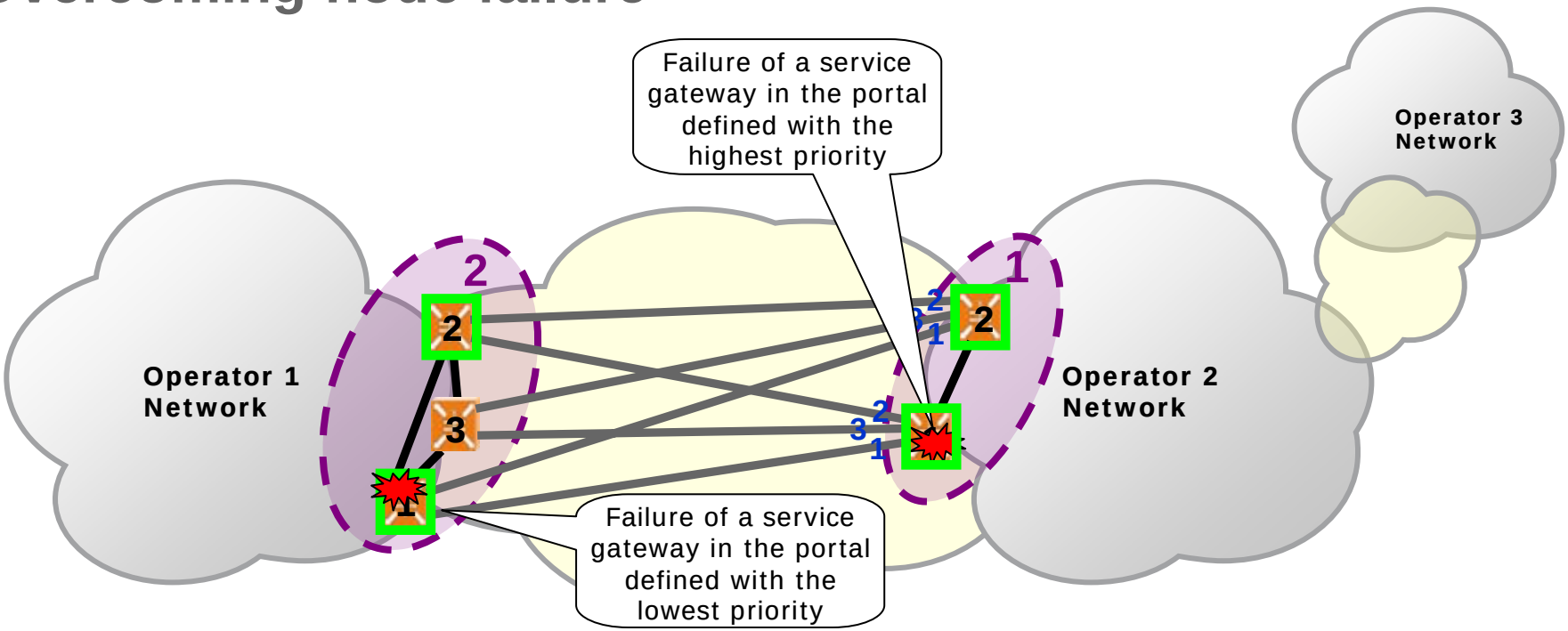
Principles of Operation
Overcoming link failure



INSP	NNI-Framework	Proposed
If there is no available link to the peer service gateways, the available external link with the highest priority is selected (working or protection). A border node which is not a service gateway, and which receives traffic, will transfer it to the service gateway in its own portal.	NNI standard protocol running between the portals	The service gateway in the portal defined with the highest priority selects the available external link with the highest priority. A border node which is not a service gateway, and which receives service traffic, will transfer it to the service gateway in its own portal.

Principles of Operation
Overcoming node failure



INSP	NNI-Framework	Proposed
If the master is not available, the deputy becomes the service gateway. The nodes in the control portal discover the absence of a service gateway by acknowledging the status of their peers in the slave portal. (The nodes in the control portal do not need to be connected to each other.) The behavior of a control node triggers one of the slave nodes to become a service gateway.	The portal selects a terminus according to its own routing protocol.	Each service portal selects its own service gateway according to node priority. A border node which is not a service gateway, and which receives traffic, will transfer it to the service gateway in its own portal.

Points for Consideration

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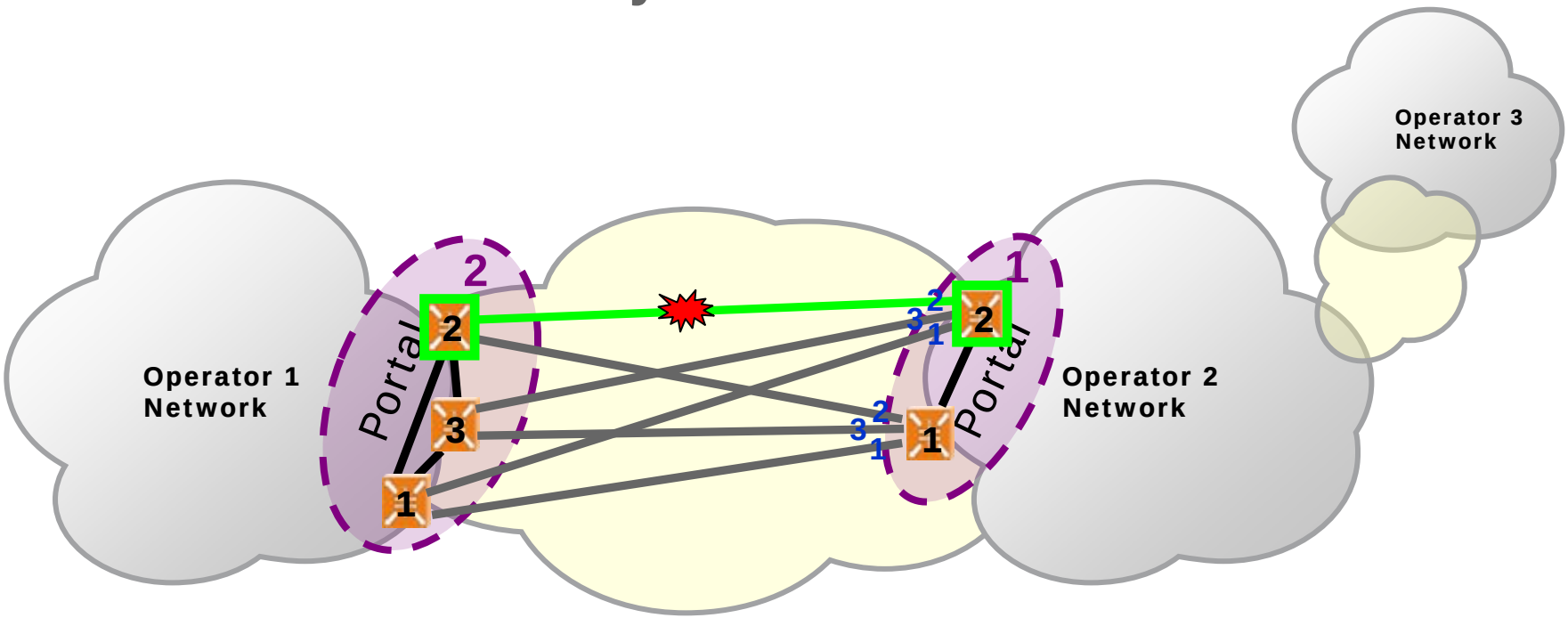
Points for Consideration
External link connectivity



Should the service portals be connected by a full mesh of external links?

If they are not fully connected, it may be more complicated to isolate failures in the NNI.

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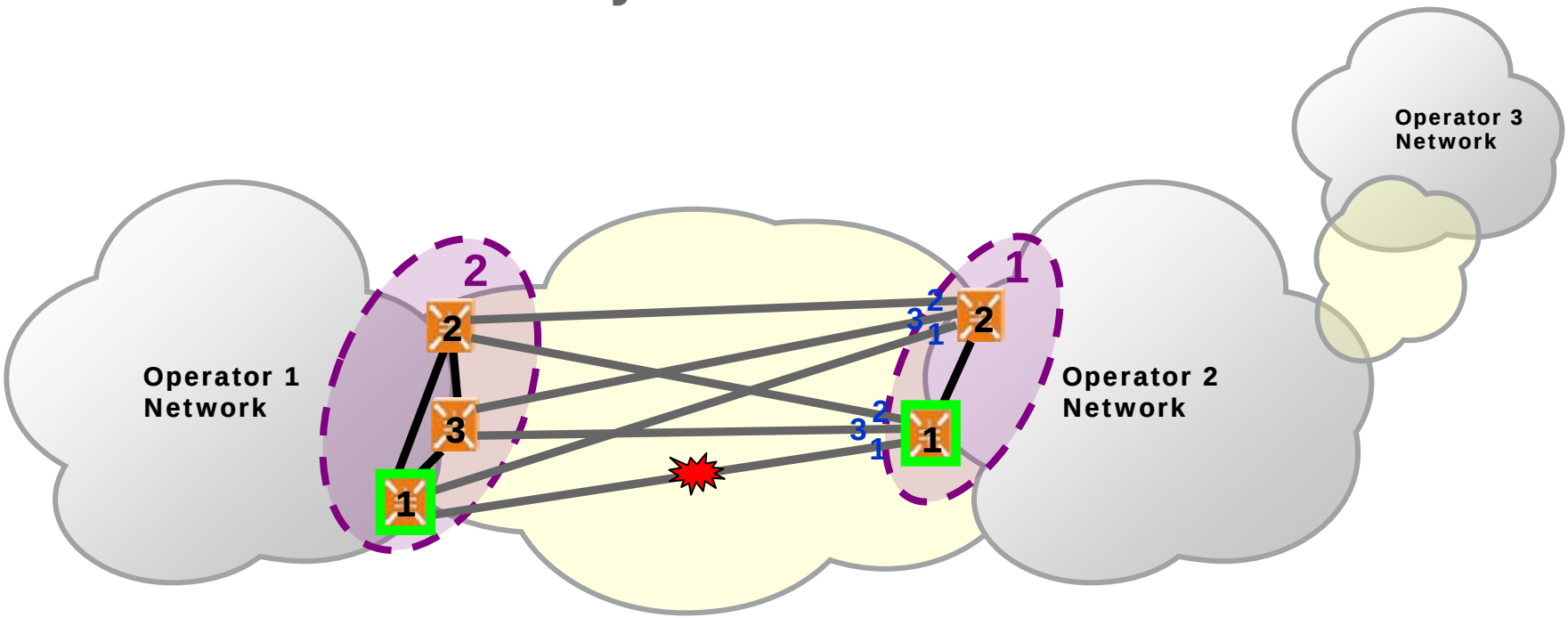
Points for Consideration
Internal link connectivity



Should all the border nodes in a service portal be connected to each other by internal links?

If they are not fully connected, it may be more complicated to isolate failures in the NNI.

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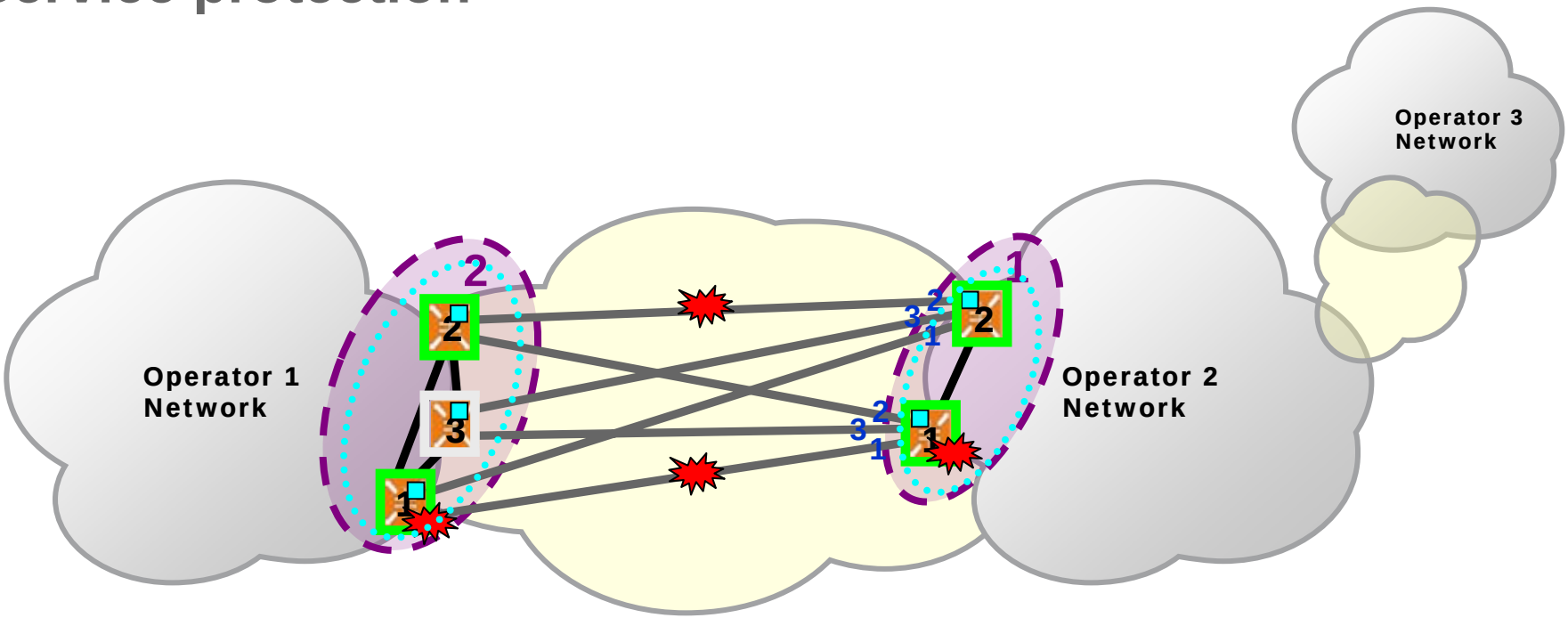
Points for Consideration

Service protection



How many nodes and links should protect a single service from a single failure?

It seems that two service portals, each comprising two nodes, two external links, and one internal link, are sufficient to protect a single service from a single failure.

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We look forward to receiving your comments!

Thank you

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