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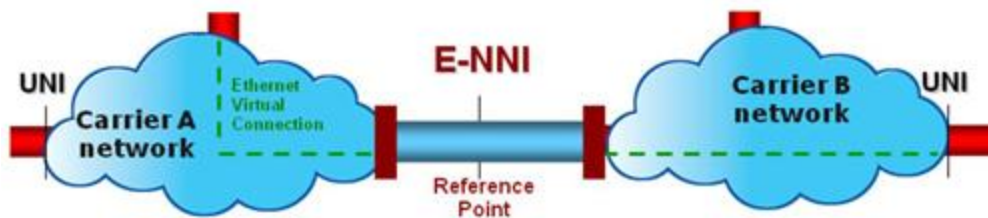
ENNI Protection

Agenda

- Example
- Requirements
- Possible solutions

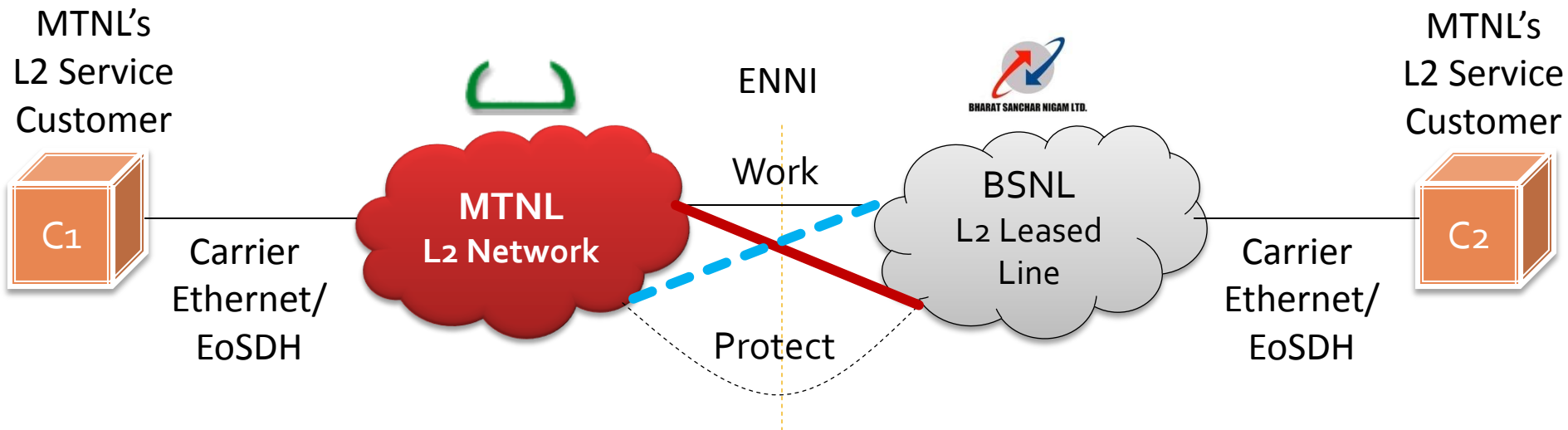
MEF Definition

- A Network-to-Network Interface (NNI) defines how two networks handshake and communicate.
- An E-NNI is a layered interface built on a point-to-point physical link or multiple point-to-point physical links connecting two MENs where the two MENs belong to different administrative domains.
 - MEF Specification: E-NNI Interface Phase 1
- An E-NNI (External NNI) join one network with another, typically two networks operated by different Service Providers, but it might also consist of two internal networks in separate maintenance regions of the same Service Provider.



Source: MEF

Topology

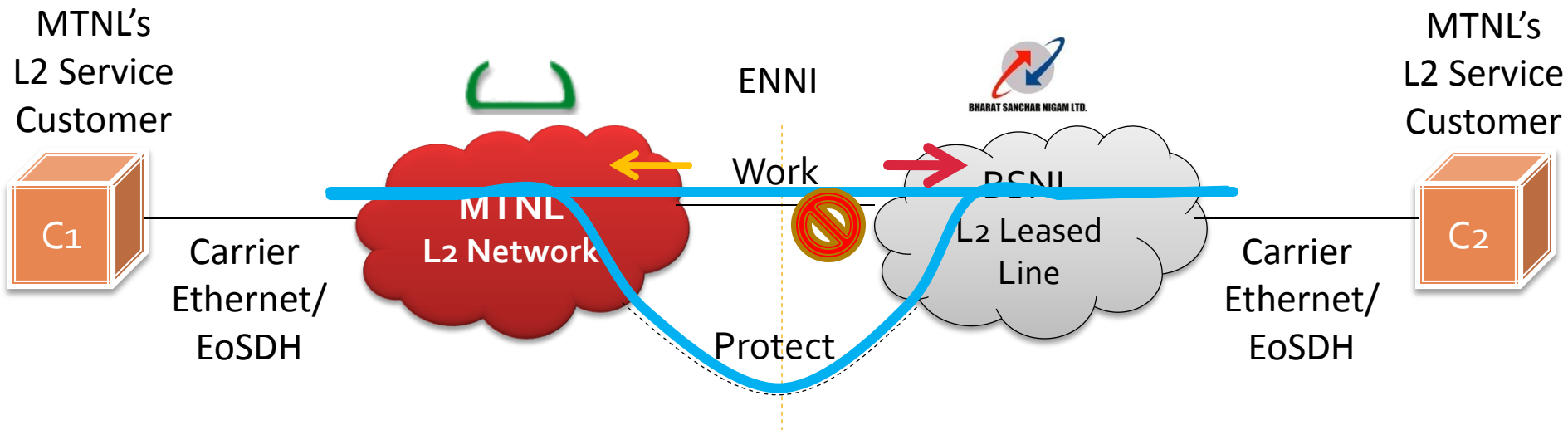


1. MTNL wants p2p L2VPN from C1 to C2
2. MTNL leases L2 service from BSNL
3. ENNI Protection issue

Three Deployment Types

- Same operator technology
- Different operator technology
- Different operator technology and ENNI is a third network between the operators
 - Is the third network an ENNI anymore or an operator?

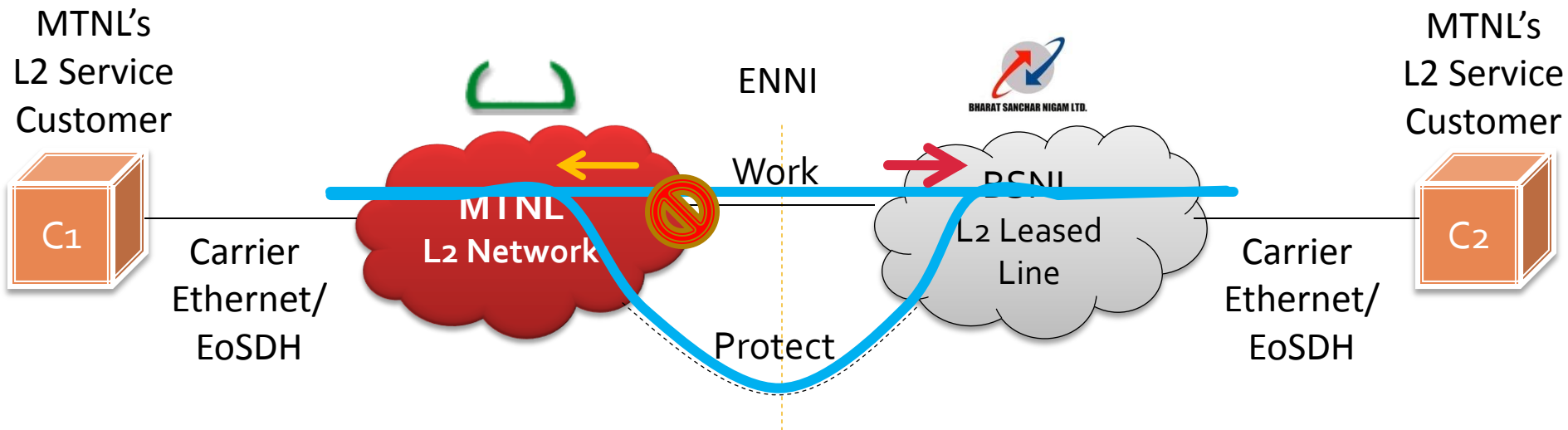
Requirement 1



1. Working-ENNI fails → traffic switches to protection-ENNI
 - Protection-ENNI could be defined over the 4 topologies mentioned

← Fault
→ Notification

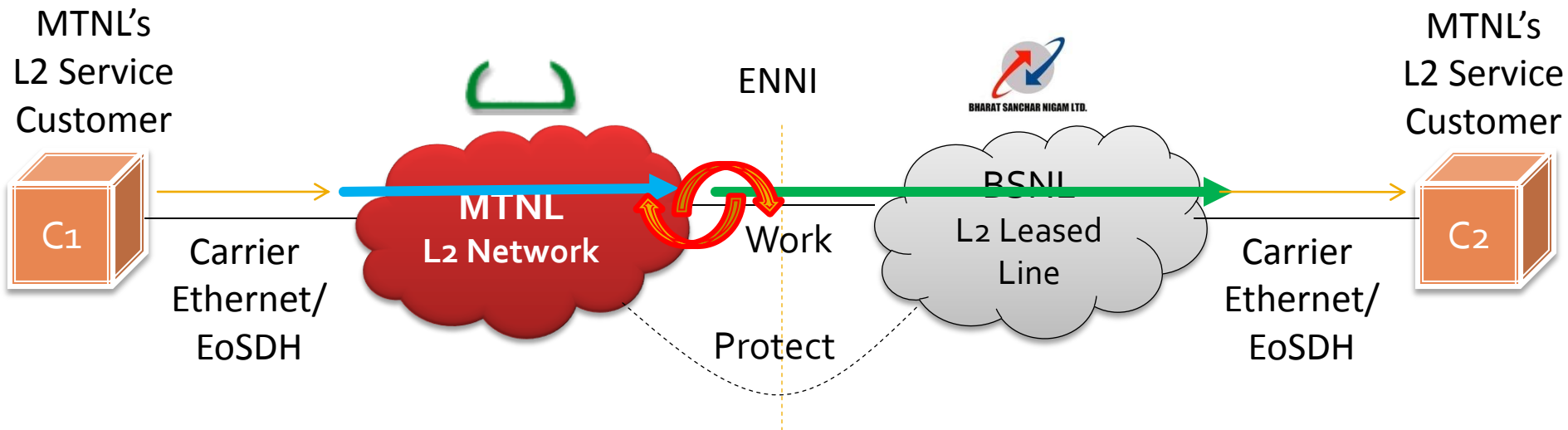
Requirement 2



← Fault
→ Notification

Fault within the operator may lead to ENNI protection

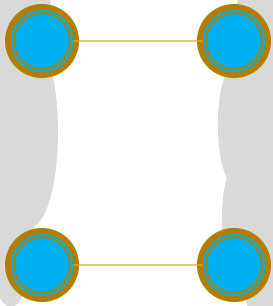
Requirement 3



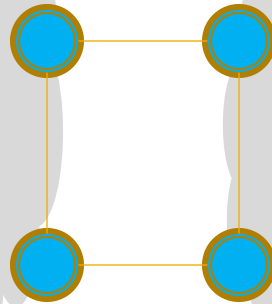
No change to the customer frames

Some ENNI Topologies

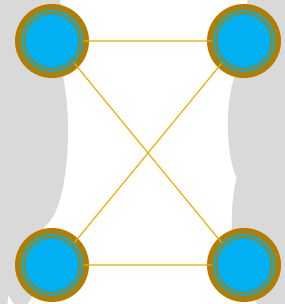
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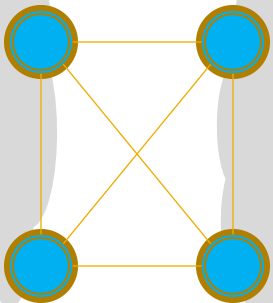
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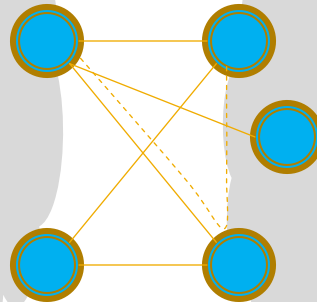
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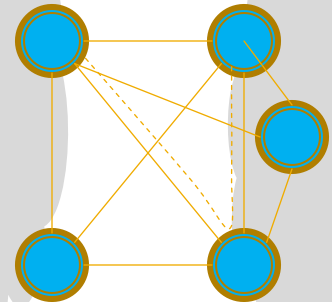
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M:N



|M:N|



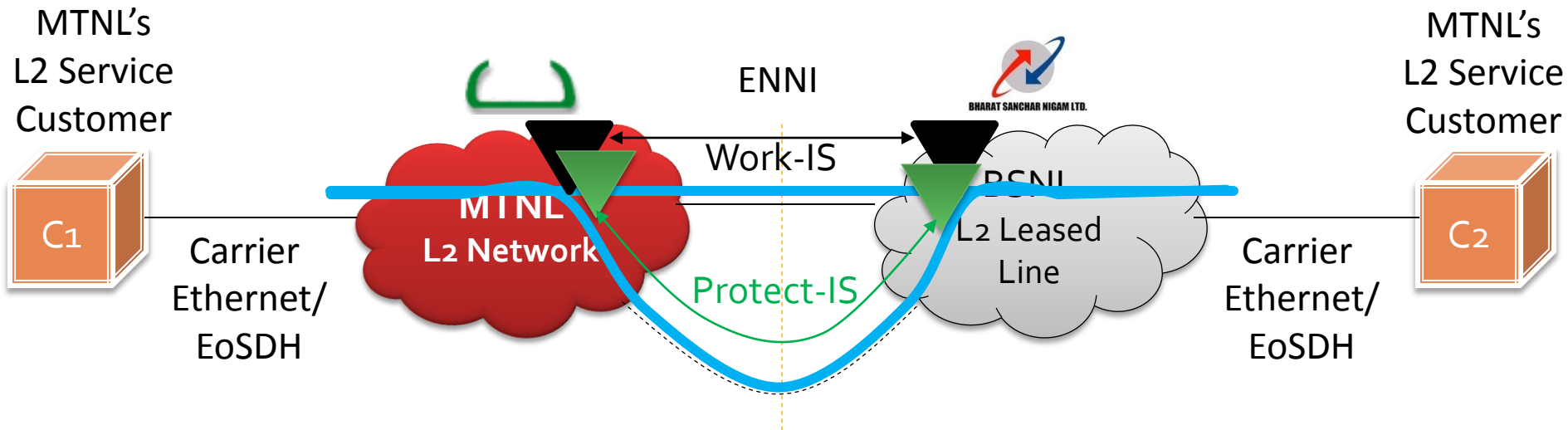
Requirements

1. MEF Requirements: E-NNI Technical Specification Phase 1
2. Work for all the topologies shown: =, o, 8, |8|, M:N, |M:N|, etc.
3. If working-ENNI fails then traffic be switched to the protection-ENNI
 - Protection from failure of ENNI link or ENNI bridge
 - Sub-50 msec protection switching
 - Protection-ENNI may share zero, one, or two terminal bridges with working-ENNI
 - Fault notification may be sent to one or both operators
4. Fault within the operator cloud may lead to traffic movement from working-ENNI to protection-ENNI
 - Example: when the node bridging MTNL and working-ENNI fails
 - Fault notification be sent towards ENNI or the peering operator
 - M:1 protections
5. No change to the customer frames and end-to-end SLA
 - Provider identifiers like S-VLAN, B-VLAN, TESI-ID, etc. may change at the ENNI from provider to provider
 - Bi-directionally congruent service path
6. Work for PBB-TE based operator network (and possibly based on PB and PBB using SPB)
7. Allow maintenance of each ENNI entity
 - The entity is owned by only one operator, and not both
 - The fiber is owned by one, and the bridges on either side of fiber is owned by each operator
8. Scalable: Service and MAC
 - B-SA translation at ENNI will avoid learning of B-MAC of one operator in another operator

Possible solutions

1. Enhancing PBB-TE with
 - Multi-domain PBB-TE and ISP
 - Advantages: Leverages existing standards and provides a more general solution
2. SPB
 - For PB and PBB based operator network interconnection
 - **Inviting contributions/collaboration on these ideas**

Solution Example 1



A multi-domain TESI is protected using multi-domain IPG

Closing

- Requesting permission for bringing a new PAR

Thank You
