Link Security Scenarios

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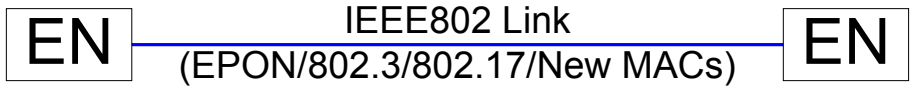
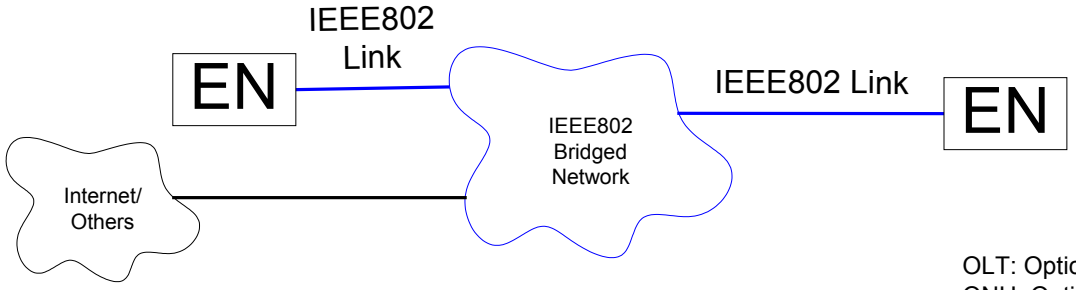
Business Scenarios

B1) EPON link scenario - Required (imminent need)

B2) Extension to other IEEE802 links/MACs - Required



B3) Layer 2 Network - Required



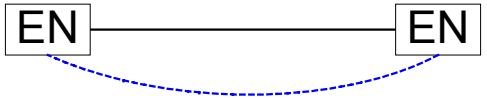
OLT: Optical Line Terminal (CO side)
ONU: Optical Network Unit (Client side)
EN: End Network Point
In blue: Scope of secure communication

Business Applications

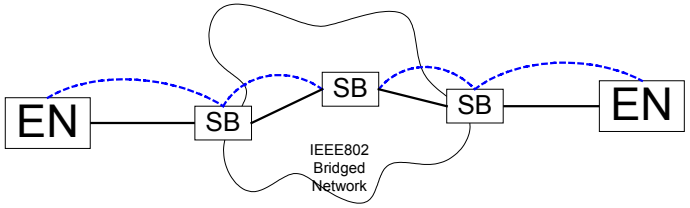
- **Scenario B1: EPON Security**
  - FTTH/FTTB (provider network)
- **Scenario B2: IEEE 802 Link Security**
  - 802.3ah copper (DSL) network (copper is easy to tap)
  - Any 802 Enterprise network (networking devices in secure locations)
- **Scenario B3: Secure Bridged Networks**
  - Layer 2 provider networks (networking devices are not in secure locations)

Trust Scenarios

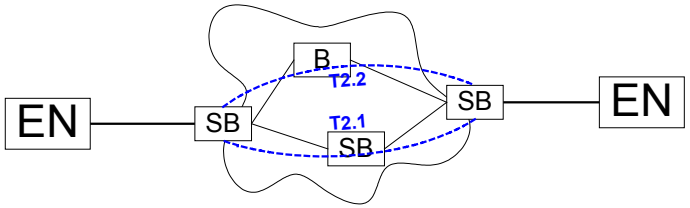
T0) Secure link communication - Required



T1) Single-hop secure bridged communication - Required

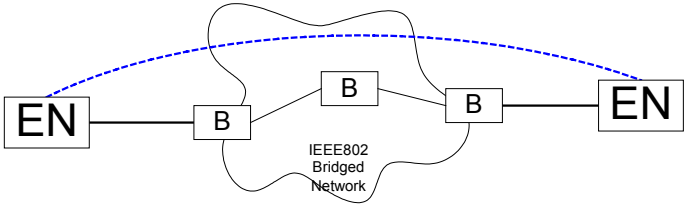


T2) Multi-hop secure bridged communication - Required



T2.1) Adjacent case - First
T2.2) Non-adjacent case - Later

T3) Layer 2 end-to-end secure communication - Nice to have



EN: End Network Point
SB: Security-aware Bridge
In black-solid: Physical communication
In blue-dotted: Logical secure communication

Scenario T0: Secure Link

- **Definition:**
  - A single link is secured
  - Security mechanism addresses MAC vulnerabilities
- **Requirements/Assumptions:**
  - Communication is “secure” on the wire only
  - Network device must be in trusted buildings for a complete secure architecture
  - MACs required to support: all 802.3 topologies
- **Business Applications:**
  - EPON scenario where ONU is inside home or business and OLT in CO building

Scenario T1: Single-hop Secure Bridged Network

- **Definition:**
  - Securing a bridged network by securing each link independently
  - Security scope is the MAC and packet is forwarded in clear to bridge level
  - This case is a cascade of several T0 Scenarios (each one can potentially operate with a different MAC)

- **Requirements/Assumptions:**
  - Still, communication is “secure” on the wire but not in the network devices
  - Network device must be in trusted buildings for a complete secure architecture
  - It does not effect the bridge functionality but it does require an extended (secure) MAC in every port of the bridge (infrastructure “upgrade”)
  - Links already secured by other means can continue using the existing security mechanism (examples: 802.11, 802.16, 802.15 links)

- **Business Applications:**
  - Same as Scenario T0
  - Enterprise Layer 2 networks (networking devices are in trusted buildings)

Scenario T2: Multi-hop Secure Bridged Network

- **Definition**
  - Securing a bridged network by transparently bridging encrypted packets
  - Security is only applied at the entrance of the packet (either by the end station or “close”bridge) or trusted points
  - Can use existing bridged networks to transport the secured packets
- **Requirements/Assumptions**
  - No security assumptions on network infrastructure
  - Requires a transparent secure data encryption (SDE) protocol
  - Needs some awareness of security in the network:
    - Every device (case T2.1): any bridge can take the function. Simpler at bridge level but more “upgrades”
    - Few devices (case T2.2): Requires a discovery protocol to replace a security-aware bridged for another security-aware bridged during topology changes
  - Should operate with any IEEE802 MAC
- **Business Applications**
  - Provider Access/MAN environments

Scenario T3: End-to-end Secure Layer 2 Communication

- **Definition:**
  - Security is done station to station
  - Network is not aware of security

- **Requirements/Assumptions**
  - Stations (or end system) must support security mechanism
  - SDE protocol must be transparent
  - This is a “simple” case of multi-hop secure bridged network

Functional Scenarios

Classification of scenarios based on functionality needed:

- **F1: Link Protection (High Priority for 802.3 networks)**
  - Addresses scenarios T0 and T1
- **F2: Adjacent bridge-to-bridge (High Priority)**
  - Addresses trust scenario T2 with infrastructure T2.1
- **F3: Non-adjacent bridge-to-bridge (Medium/Low Priority)**
  - Addresses trust scenario T2 with infrastructure T2.2