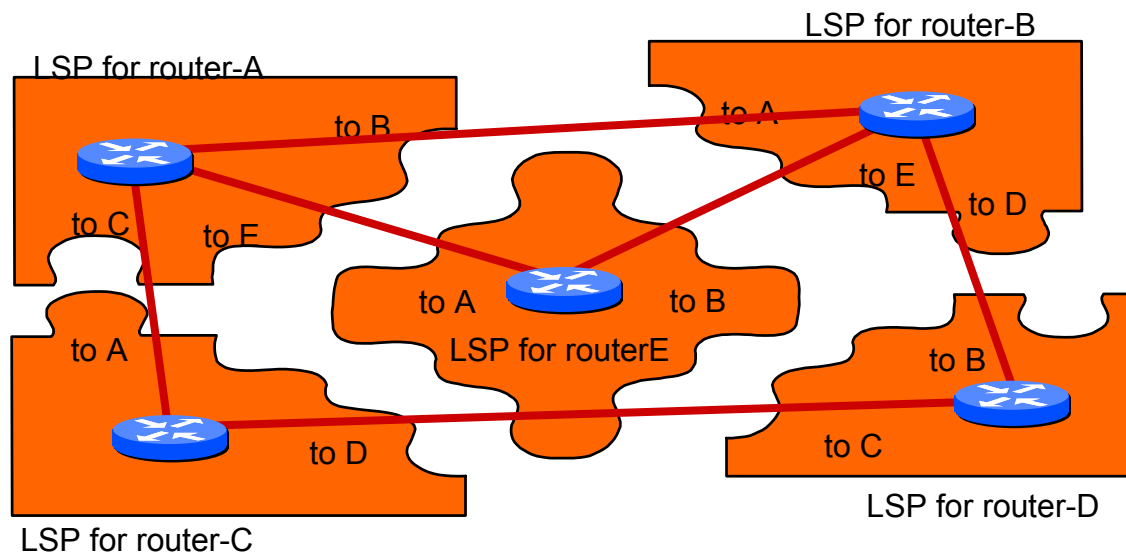


Intermediate System to Intermediate System – IS-IS Routing Protocol

Internetworking - Module 14

IS-IS is the Intermediate System to Intermediate System intra-domain routing protocol defined in 1992 in the ISO/IEC recommendation 10589



Outline

- Background
- IS-IS Overview
 - ⊗ Feature
 - ⊗ Terminology
 - ⊗ Level-1 / Level-2 Routing Systems
 - ⊗ How IS-IS works
 - ⊗ Design Consideration
- Conclusion

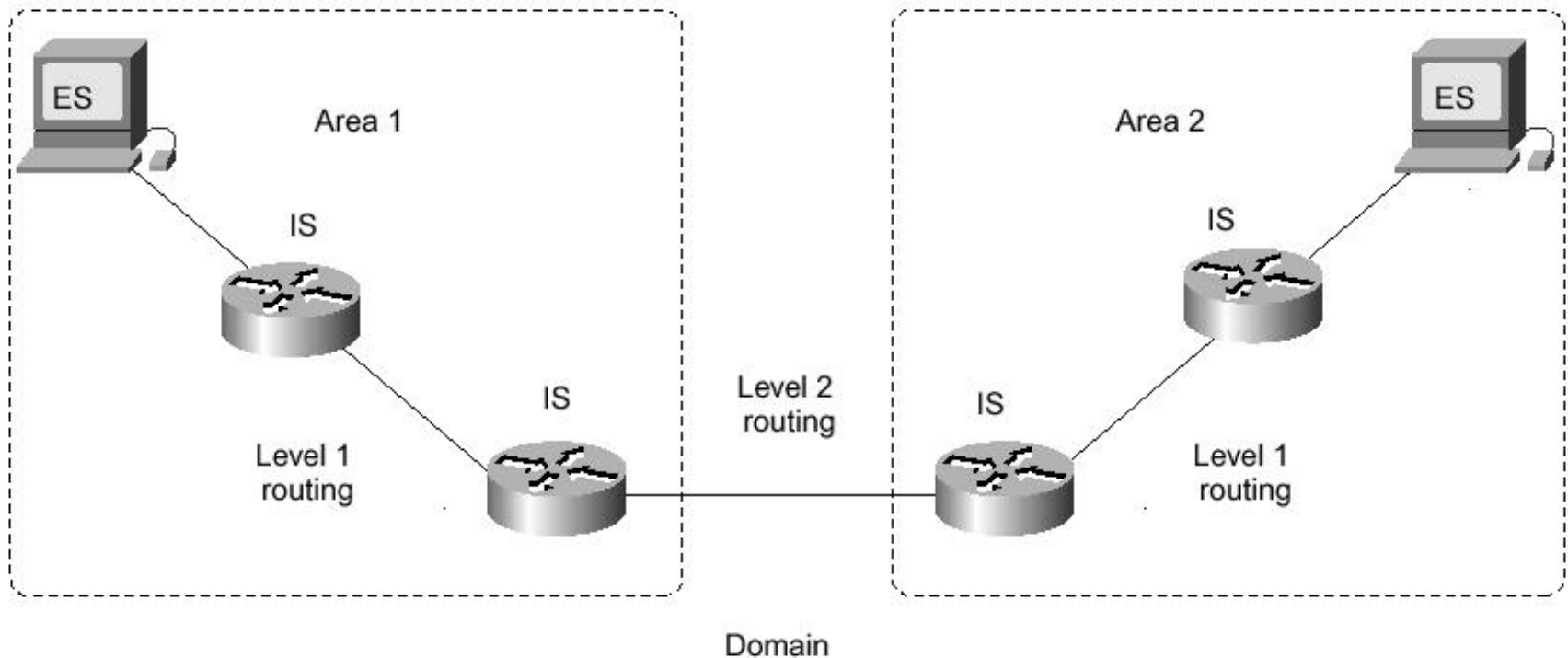
Background – OSI systems

- Two type of systems
 - ⊗ End System (ES)
 - Hosts or Workstations
 - ⊗ Intermediate System (IS)
 - Routers
 - Level 1 Routers (L1 Routers)
 - Level 2 Routers (L2 Routers)
 - Level 1 and Level 2 Routers (L1L2 Routers)
- ES-IS
 - ⊗ Discovery protocol
 - ⊗ Define how ESs and ISs learn about each other
 - ⊗ IS Hello messages (ISHs) and ES Hello Messages(ESHs)
- IS-IS
 - ⊗ Link-State Hierarchical Routing Protocol
 - ⊗ Flood link-state information between intermediate systems (routes)
 - ⊗ Build a complete picture of network topology

Background – OSI Network

- Level 1 routing is routing within a Level 1 area
- Level 2 routing is routing between Level 1 areas.

Figure 45-1 Areas Exist Within a Larger Domain and Use Level 2 Routing to Communicate



Background – IS-IS Goal

- IS-IS
 - ⊗ A Protocol of Network Layer
 - ⊗ An Interior Gateway Protocol (IGP)
- To Route in ISO Connectionless Network Protocol (CLNP) Networks.
- Now to Support Both CLNP and Internet Protocol (IP) networks.

Background -OSPF

- No OSPF at that time
- OSPF was derived from
 - ⊗ SPF algorithm
 - ⊗ Fault-tolerant Broadcasting of Routing Information
 - ⊗ BBN's work on area routing
 - ⊗ IS-IS routing protocol
- OSPF can only support IP

IS-IS Overview - Feature

- Support Both CLNP and IP network
- Link State Protocol
 - ⊗ Similar to OSPF
 - ⊗ But OSPF Supports Only IP
- Hierarchical Routing
 - ⊗ Simplify Backbone Design
 - ⊗ Embraced by Large Tier1 ISPs
- Stable and Scalable
- Very Fast Convergence
- Flexible in terms of tuning and easily extensible to new features

IS-IS Overview - Terminology

■ Terminology and Acronyms

⊗ Intermediate System (**IS**)

□ Router

⊗ End System (**ES**)

□ Network Host or Workstation

⊗ Packet Data Unit (**PDU**)

□ Analogous to IP packet

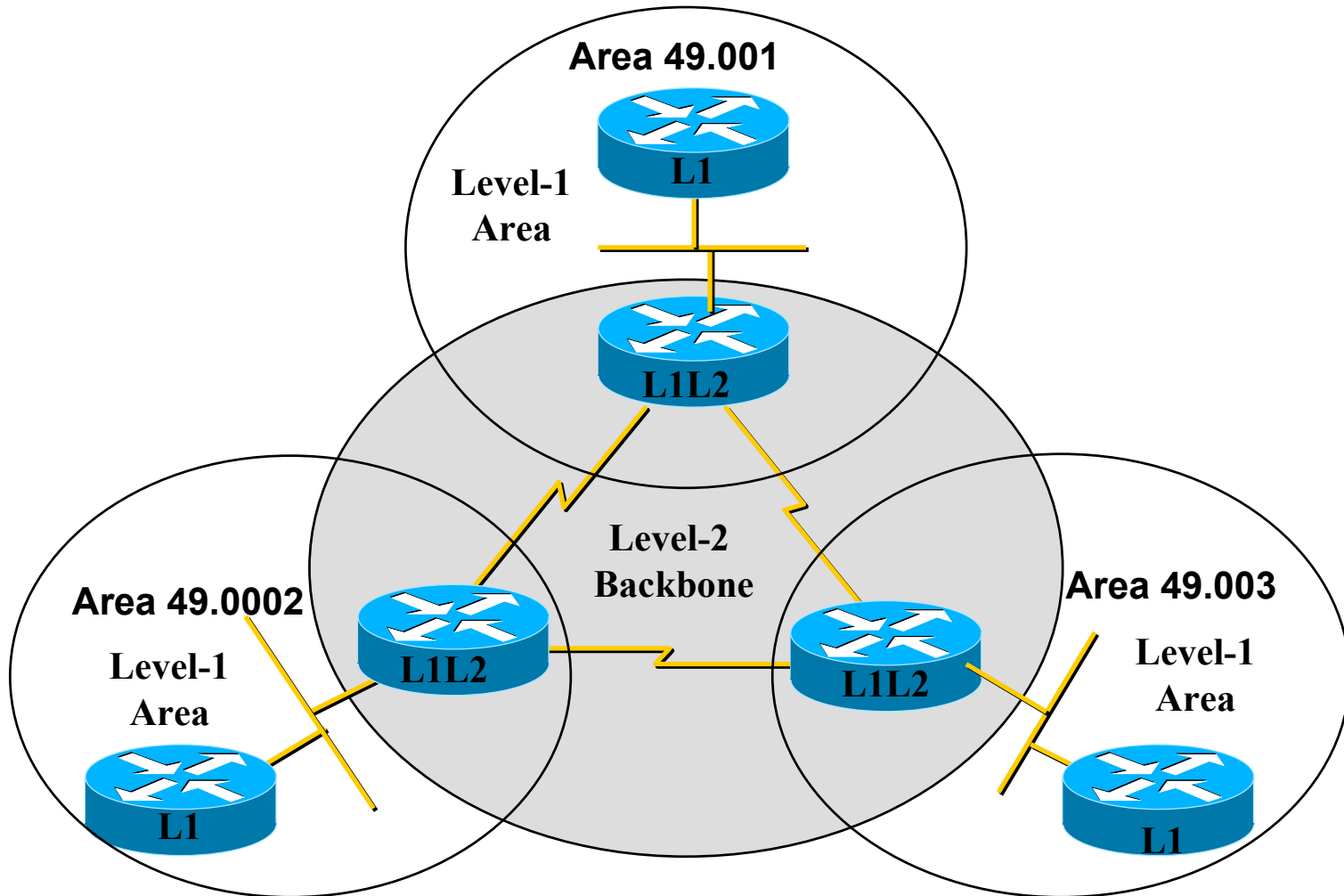
⊗ Link State PDU (**LSP**)

□ Routing Information Packet

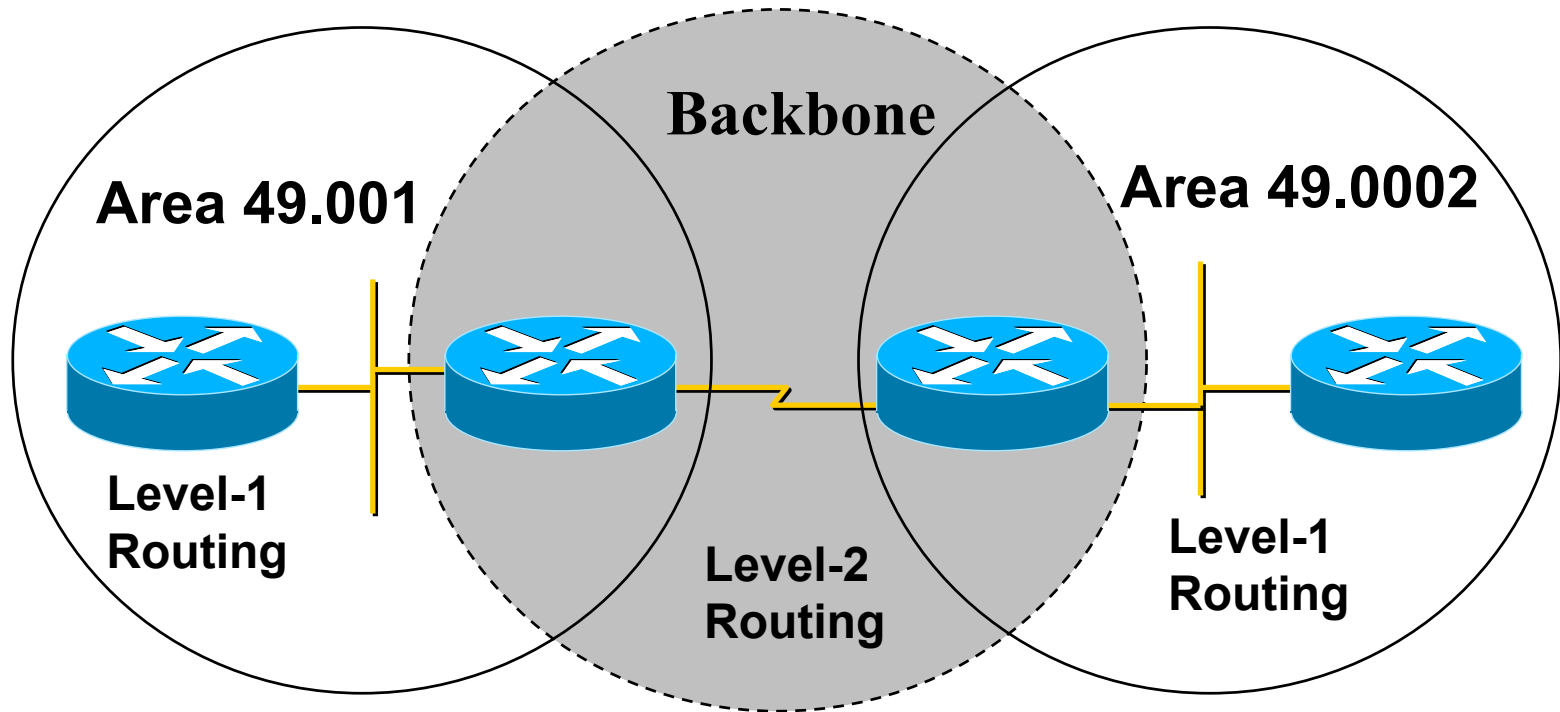
IS-IS Overview - Concepts

- Network Nodes
 - ⊗ Hosts (ES)
 - ⊗ Level-1 Routers (IS)
 - ⊗ Level-2 Routers (IS)
- Link Types
 - ⊗ Point-to-Point Links (WAN serial, ptp FR)
 - ⊗ Broadcast Links (Ethernet, etc.)
- Sub-networks
 - ⊗ Point-to-Point subnetworks
 - ⊗ Broadcast subnetworks
 - ⊗ General Topology subnetworks.
- Areas
 - ⊗ A group of contiguous networks and attached hosts

IS-IS Overview - Areas



IS-IS Overview - Routing



- IS-IS supports 2-level routing hierarchy
- Routing domain is carved into areas. Routing in an area is level-1. Routing between areas is level-2

IS-IS Overview – Benefit

■ Hierarchical Routing

- ⊗ Simplify Backbone Design

- ⊗ Level 1 ISs need to know only how to get to the nearest Level 2 IS

- ⊗ Backbone routing protocol can change without impacting the Intra-area routing protocol.

Conclusion - Advantage

■ IS-IS

- ⊗ Suitable to deploy in large networks
- ⊗ Open, described in detail in RFC 1142
- ⊗ Supports both CLNP and IP networks
- ⊗ Embraced by the large Tier1 ISPs
- ⊗ Proven to be a very stable and scalable, with very fast convergence
- ⊗ Link-state hierarchical routing protocol
 - Level 1 routing
 - Level 2 routing