On the InfiniBand Subnet Discovery Process

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Introduction
InfiniBand Architecture (IBA)
- New technology for high speed I/O and interprocessor communication
- Switched point-to-point network
- Hardware: serial links, channel adapters, switches, routers

Subnet Management Support
- Tasks: discover, configure, activate, and manage the subnet
- Management entities: manager (SM) and agents (SMAs)
- SM and SMAs exchange control packets (SMPs) through the SMI

Topology Discovery Process
- The SM identifies all active subnet devices
- Implementation not detailed in the initial IBA specifications

A Complete Discovery Mechanism
- Propagation order exploration of the entire topology
- Directed route SMPs (processed in each intermediate SMI)

Example
- discover devices 1, 2, 3, and 4
- device addition (16, 17, and 18)

The Partial Discovery Mechanism
- Topology changes affect small portions of the subnet
- Explore only the region that has been directly affected by the change
- SMPs with initial LS/destination routed segments (avoid SMI processing)

Example
- device addition (16, 17, 18)
- change detection and device discovery:
  - partial discovery: 35 SMPs (table)
  - complete discovery: 123 SMPs

Performance Evaluation
Simulation Methodology
- OPNET Modeler
- The model includes IBA link and network layers, and the subnet management infrastructure
- Randomly generated subnet topologies
- Experiments: addition or removal of one or several subnet devices
- Collected statistics: discovery time and SMPs

Simulation Results
- Individual device addition/removal
- Multiple additions
- Multiple removals

Conclusions and Future Work
- Partial discovery requires less time and control packets
- to assimilate the new subnet topology
- Benefits increase as the topology gain increases and as the proportion of the subnet that actually changes is reduced
- Optimize other subnet management functions, in particular, subnet nodes computation and distribution