NonStop Customer Technical Update Conference Call

TCP/IP Review

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HP IP CLIM Development
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Communication Products

- TCP/IP – Conventional TCP/IP
- TCP/IPv6
- Cluster I/O Protocols (CIP)
  - For IP CLIM
Communication Hardware

- TCP/IP and TCP/IPv6
  - Adapters
    - G4SA, FESA, E4SA, CCSA, TRSA
    - GESA, ATM3SA (no longer available)
    - SWAN, SWAN2 attachment

- CIP
  - CLIMs
    - 5 Copper
    - 3 Copper / 2 Fiber
    - TELCO
    - SWAN, SWAN2 attachment
Ethernet Port

• Adapter
  – SUBNET -> LIF -> PIF
    • SN1 -> L0153A -> E0153.0.A
    • SN2 -> L11123D -> G11123.0.D

• CLIM
  – Interface
    • N1002581.eth1
    • N1002582.bond0
TCP/IP Stack

- **TCP/IP**
  - TCP/IP Process
    - resides on one CPU at a time (backup process)
- **TCP/IPv6**
  - LNP
    - parallel, resides on all CPUs
  - TCP6SAM
    - handles socket opens and closes
- **CIP**
  - PROVIDER
    - parallel, resides on all CPUs
    - partially offloaded to CLIM
  - CIPSAM
    - handles socket opens and closes
TCP/IP (Conventional)
TCP/IPv6

LNP (Logical Network Partition) = ZTCP6DLL + TCP6MON

CPU 0

TCP6SAM
$ZTC0

App

LNP (ZTC0)

G4SA

CPU 1

App

LNP (ZTC0)

Data

Open/Close
CIP

PROV = ZCIPDLL + CIPMON

Open/Close

Data
Granularity of Ethernet Ports per stack

• TCP/IP
  – one or more physical interfaces (PIFs) per stack
  – one or more stacks per PIF

• TCP/IPv6
  – one or more PIFs per stack

• CIP
  – one or more CLIMs (5 ports) per stack
Failover

• TCP/IP
  – Backup TCP/IP process
    • lose connections
    • UDP and Listening sockets survive if using Fault Tolerant sockets

• TCP/IPv6
  – seamless PIF to PIF failover

• CIP
  – Bonded
    • seamless interface to interface failover (same CLIM)
  – failover pair
    • interface to interface failover (different CLIMs)
    • lose connections
    • UDP and Listening sockets survive
Common Functionality

- TCP/IP IPv4
- UDP IPv4
- SWAN connectivity
TCP/IP functionality

• Fault Tolerant Sockets
• Remote Sockets
• TCP/IP over ATM, Token Ring, or X.25
TCP/IPv6 functionality

- TCP/IP IPv6
- UDP IPv6
- Round Robin Sockets
  - one per CPU
CIP functionality

- TCP/IP IPv6
- UDP IPv6
- SCTP IPv4 and IPv6
- Round Robin Sockets
  - many per CPU
CIP Differences

- Management is a combination of SCF and CLIMCMD
- TCPDUMP and WIRESHARK for IP level tracing
- I/O Essentials for seamless management
- Software update via NSC, not SUT based
CIP need to know

- Restriction of 192.168.*** on Blades
- More complex routing setup required
- TELSERV T9553AEP – bind to IP Address
- LISTNER T8602AAY – bind to IP Address
- SWAN BRcvPort
IOAME vs. CLIM

- **IOAME**
  - Fault Tolerant Sockets
  - Remote Sockets
  - TCP/IP ATM, TR, or X.25
  - SNA over ethernet (SLSA)
  - TCP/IPv6 Failover

- **CLIM**
  - Performance. < CPU utilization and > throughput
  - IPSec
  - SCTP
Technology for better business outcomes
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IP CLIM Failover

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IP CLIM Failover

- Two Modes of Failover
  - Intra-CLIM
    - Failover between two or more interface in the SAME CLIM
    - Bonding
  - CLIM-to-CLIM failover
    - Failover between two interface in DIFFERENT CLIMs
      - Failover Pair
IP CLIM Failover - Bonding

- Bonding
  - Configured with “climconfig (slave)interface”
  - leverages Linux Bonding mode
    - Bonds two or more physical interfaces into one logical interface
  - Seamless failover when link pulse is lost
  - Bonding Modes – applies to all bonded interfaces
    - 1 – active-backup
    - 5 – balance-tlb (Adaptive Transmit Load Balancing)
    - 6 – balance-alb (Adaptive Load Balancing)
      - Receive balance for IPv4 only
      - Use ARP to balance receive traffic to multiple MAC addresses
  - Primary Slave configuration (J06.09)
IP CLIM Failover - Bonding

- Bonded Interface MAC address
  - MAC address of first “functional” configured slave used in all modes
    - NIC and driver functional (link pulse is optional)
    - Used for IPv6 Link Local and Dynamic Addresses
    - Used for ARP replies
  - MAC address remains unchanged for the life of the activation
  - Moved from slave to slave as needed by link pulse failures
  - MAC address of other slaves used in bondmodes 5 and 6
    - Except for ARP replies in bondmode 5
  - MAC address of other slaves used in ARP replies to balance receive traffic for bondmode 6
    - Hashed on source address
Bonding

Provider ZTC0

IPA: 10.2.100.11
IP CLIM Failover – Failover Pair

• CLIM-to-CLIM failover
  – Configured with “climconfig failover”
  – Manage by NonStop Host (CIPMAN)
  – Occurs when an interface (all slaves of a bond) or CLIM fails
  – Interface Resources (IP Address, Routes) moved from failed interface to failover interface on the failover CLIM
  – TCP/IP connections are lost and reset. Similar to losing the CPU hosting the TCP/IP process on Conventional TCP/IP
    • Clients must reconnect
  – UDP and TCP Listening sockets are migrated to the new CLIM
    • Servers continue uninterrupted
IP CLIM Failover – Failover Pair

• CLIM-to-CLIM failover
  – Requires operator intervention to restore the interface to its home CLIM (SCF SWITCH)
  – Routing considerations (Sabu to discuss next week)
    • default routes
    • multiple routes to destination with differing gateways
Failover Pair

Provider ZTC0

IPA: 10.2.100.11

IPA: 10.2.100.12
Failover Pair with Bond

Provider ZTC0

IPA: 10.2.100.11
IPA: 10.2.100.12
Failover Pair – Maximum Fault Tolerance

Provider ZTC0

Failover Pair

IPA: 10.2.100.11
IPA: 10.2.100.12
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