


2D02

OpenVMS LAN Update

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Today's Agenda

- OpenVMS 7.3-2 New LAN Features:
 - LAN FastPath
 - LAN Failover


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OpenVMS LAN Features

- LAN Fastpath
- LAN Failover

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LAN Fastpath - Components

- Reduce contention for the IOLOCK8 spinlock by providing LAN specific spinlocks
- Offload primary CPU by allowing the LAN drivers to take interrupts and to complete I/O on secondary CPUs (CPU Affinity)

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LAN Fastpath - Spinlocks



- Spinlock Modifications:
 - All V7.3-2 LAN drivers synchronize access to LAN data structures with LAN specific spinlocks
 - A unique LAN spinlock for each LAN adapter
 - LAN QIO applications continue to use IOLOCK8
 - LAN VCI users can use IOLOCK8 or their own spinlock
 - V7.3-2 PEDRIVER and TCP/IP V5.4 are fastpath enabled

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LAN Fastpath – CPU Affinity



- CPU Affinity
 - Supported on most LAN adapters (not Token Ring or ATM)
 - LAN's 'Preferred CPU'
 - Initially assigned by FASTPATH_SERVER process
 - User settable with SET DEVICE/PREFERRED_CPU
 - Optional via SYSGEN flag
 - FAST_PATH – system-wide parameter
 - FAST_PATH_PORTS
 - Bit 3 clear = FP enabled for LAN
 - Bit 3 set = FP disabled for LAN

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LAN Fastpath – CPU Affinity

```
$SHOW DEVICE EIA0/FULL
```

Device EIA0:, device type I82558, is online, network device, error logging is enabled, device is a template only.

Error count	1	Operations completed	0
Owner process	" "	Owner UIC	[SYSTEM]
Owner process UD	00000000	Dev Prot S: RWPL, O: RWPL, G, W	
Reference count	0	Default buffer size	512
Current Preferred CPU ID	2	Fastpath	1
Current Interrupt CPU ID	2		

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LAN Fastpath – CPU Affinity

```
$>SET DEVICE EIA0/PREFERRED_CPU=1
$>SHOW DEVICE EIA0/FULL
```

Device EIA0:, device type I82558, is online, network device, error logging is enabled, device is a template only.

Error count	1	Operations completed	0
Owner process	" "	Owner UIC	[SYSTEM]
Owner process UD	00000000	Dev Prot S: RWPL, O: RWPL, G, W	
Reference count	0	Default buffer size	512
Current Preferred CPU ID	1	Fastpath	1
Current Interrupt CPU ID	1		

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LAN Fastpath – Spinlock Tracing

Comparison IOLOCK8 Usage (all consumers)

	<u>% Time Held</u>		<u>Acquires /Second</u>	
	<u>V73-1</u>	<u>V73-2</u>	<u>V73-1</u>	<u>V73-2</u>
<u>CPU 0</u>	10.8	0.4	1824.1	80.9
<u>CPU 1</u>	2.4	1.1	346.6	684.4

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LAN V7.3-2 FEATURES

LAN Failover

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LAN Failover – What is it?

- A mechanism which allows LAN applications to continue to run when a failure occurs between the LAN adapter and the switch (link loss, broken adapter).
- Provides a failover mechanism for **all** LAN applications (TCP/IP, LAT, DECnet...).

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LAN Failover – How does it work?

- Integrates multiple network adapters on the same LAN segment into a **failover set** and presents it as a virtual device (**LLa**) to the LAN applications.
- One network adapter in the failover set is active while the others remain idle.
Note: Does not perform load balancing.
- If the active device fails, one of the idle devices, in the failover set, becomes active.

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LAN Failover – MAC address

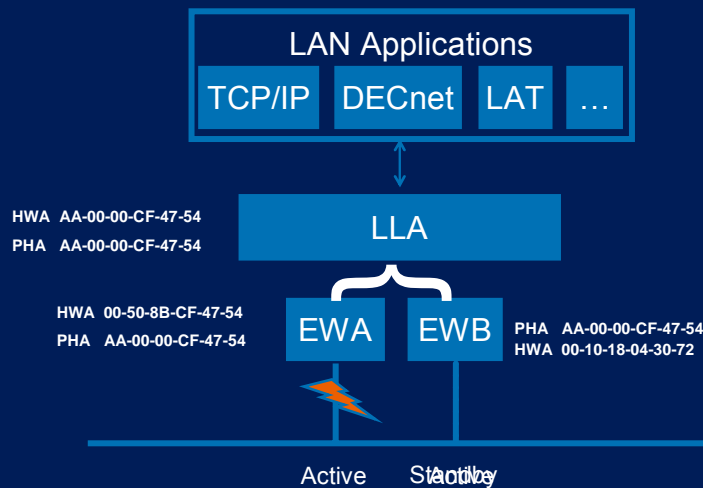
- HWA of virtual device:
 - First three bytes = AA-00-00
 - Last three bytes = Same as last three bytes of the HWA of the first active physical device.
- The physical and multicast addresses of the virtual device remain the same allowing for continuous operation of LAN applications.

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LAN Failover – Example



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LAN Failover – Management

- LANCP (LAN Control Program)
 - Used to manage LAN Failover
 - **SET/SHOW** commands - volatile data base
 - **DEFINE/LIST** commands – permanent database
- Creating a LAN Failover set:
 - LANCP> **SET DEVICE LLA/FAILOVER_SET=(EIA,EIB,EIC,EWA)**
- Removing a device from a LAN Failover set:
 - LANCP> **SET DEVICE LLANOFAILOVER_SET=(EIC)**
- Prioritizing the failover devices:
 - LANCP> **SET DEVICE EIA/PRIORITY=20**
 - LANCP> **SET DEVICE EIB/PRIORITY=10**
 - LANCP> **SET DEVICE EWA/PRIORITY=30**

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LAN Failover – Management (continued)

- Connecting virtual device to physical device:
 - LANCP> **SET DEVICE LLA/ENABLE**
%LLDRIVER, Logical LAN event at 5-NOV-2003 08:12:10.06
%LLDRIVER, Logical LAN connected to physical port **EWA0**
- Disconnecting virtual device from physical device:
(LAN applications must not be started over virtual device.)
 - LANCP> **SET DEVICE LLA/DISABLE**

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LAN Failover – Management (continued)




- Displaying virtual device characteristics:
 - LANCP> **SHOW DEVICE LLA/CHARACTERISTICS**

```

Device Characteristics LLA0:
  Value Characteristic
  -----
    1500 Device buffer size
    Normal Controller mode
    External Internal loopback mode
    AA-00-00-CF-47-54 Hardware LAN address
                        |
                        v
                    "EWA" Failover device (active)
                    "EIA" Failover device
                    "EIB" Failover device
                    Enabled/Active Logical LAN
    
```

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LAN Failover – Management (continued)



- Displaying physical device characteristics:
 - LANCP> **SHOW DEVICE EWA/CHARACTERISTICS**

```

Device Characteristics EWA0:
  Value Characteristic
  -----
    1500 Device buffer size
    Normal Controller mode
    External Internal loopback mode
    00-50-8B-CF-47-54 Hardware LAN address
                        |
                        v
                    30 Priority
    
```

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LAN Failover – Management (continued)



- LAN Failover Verification:
 - LANCP> SET DEVICE LLA/SWITCH

%LLDRIVER, Logical LAN event at 5-NOV-2003 11:48:12.54

%LLDRIVER, Logical LAN disconnected from physical port EWA0

%LLDRIVER, Logical LAN event at 5-NOV-2003 11:48:12.54

%LLDRIVER, Logical LAN connected to physical port EIA0

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LAN Failover Supported Adapters



- LAN Failover - Supported Adapters
 - DE600
 - DEGPA DEGXA
 - Plus any embedded variant

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LAN Failover - Configuration Restrictions



- Physical adapters in a LAN Failover cannot be in use when the set is created
- Maximum of eight physical devices are supported in a LAN failover set
- Physical adapters cannot be connected point-to-point
- Not supported on OpenVMS cluster satellites
- Jumbo frames are not supported

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LAN Failover - Futures




- DE500 Support
VMS732_LAN-V0200
- Jumbo Frames
- Network monitor for detecting failures
- Cluster usage of stand-by adapter

- Link Aggregation

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LAN Failover & failSAFE IP



Comparison features chart of LAN Failover and failSAFE IP.

Feature	LAN Failover	failSAFE IP
NIC Usage	One active NIC, others are standby	All NICs Active with load balancing
Devices supported	Ethernet device types – DEGXA, DEGPA and DE600	Independent of device types
Protocols Supported	all LAN protocols	TCP/IP only
Failover time	Typically milliseconds	Typically a few seconds

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