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# OpenVMS network integration

Integrating OpenVMS systems as part of a heterogeneous networked infrastructure

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# XDelta – who we are

- Independent consultants since 1996:
  - UK based with international reach
  - Over 30 years experience with OpenVMS
- We design and implement solutions:
  - Mission critical systems
  - Cross-sector experience
  - Engineering background
  - Gartner (2009):
    - Identified XDelta as one of few companies world-wide capable of OpenVMS migration related projects

**Business Partner**



# OpenVMS network integration - topics

- Multiple protocols – not just TCPIP V4
- Network connectivity: VLAN tagging, LAN failover
- LDAP / Windows AD authentication
- File sharing: FTP / SFTP, NFS, CIFS
- Terminal access: TELNET, SSH
- Web server: CSWS, TOMCAT
- Monitoring tools: WBEM, SMH, SNMP
- Management tools: Availability Manager

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# OpenVMS networking: multiple protocols

- TCPIP V4
- TCPIP V6
- DECnet Phase IV
- DECnet-Plus and DECnet over IP
- SCS (use SCACP)
- Clustering over IP
- AMDS (Availability Manager)
- LAT / MOP / Remote Console (Terminal Servers)
- LAD / LAST (Infoserver)

# OpenVMS networking: multiple addresses

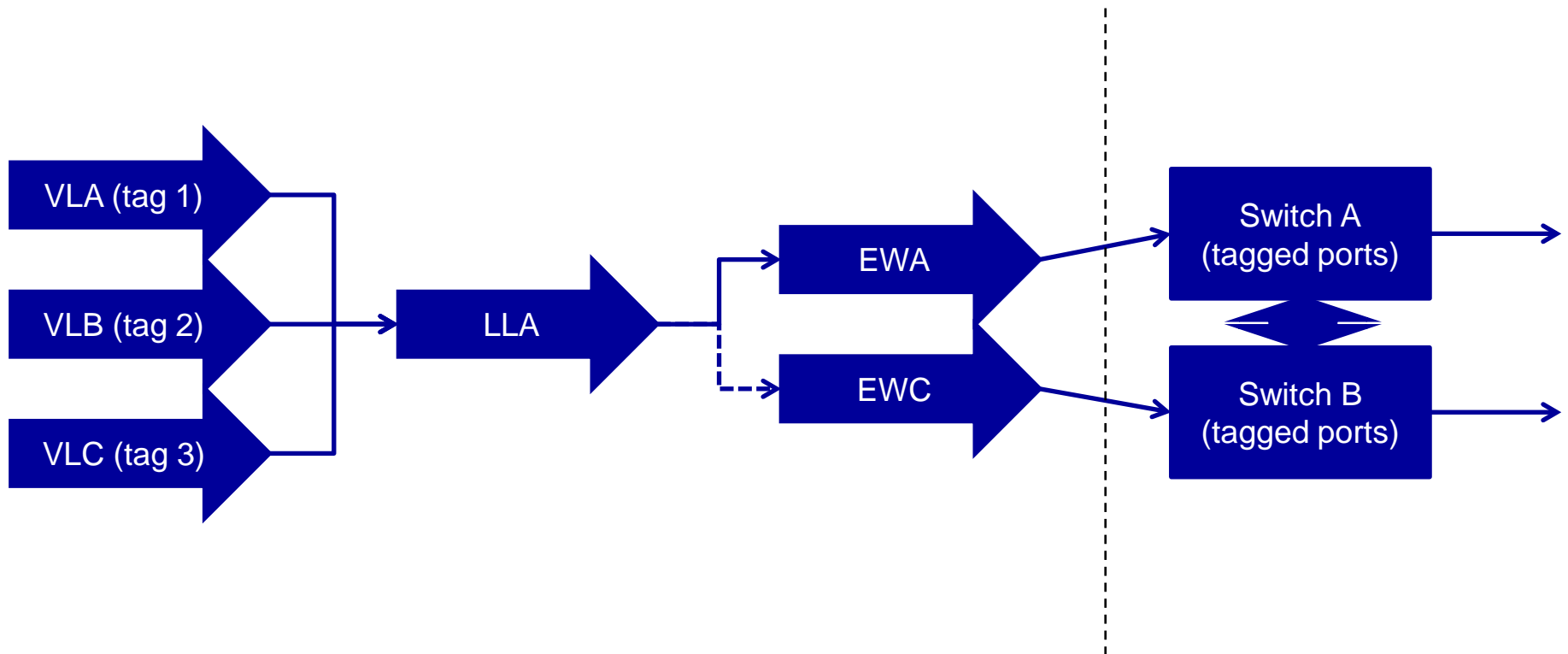
- DECnet naming is “per node”
- TCPIP addressing is “per interface”
- TCPIP allows multiple addresses per interface – and they can move between interfaces
- TCPIP - use “service addresses” that can be moved and enabled / disabled as needed
- TCPIP - use multiple subnets
- SCS, AMDS, LAT etc. are layer 2 non-routable

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# OpenVMS networking: jumbo frames

- Performance is better
- All intervening devices in the network infrastructure must have jumbo frame support enabled
- LAN\_FLAGS bit 6 (64) enables jumbo frame support
- LANCP /JUMBO qualifier enables / disables jumbo frame support on a per device basis

# OpenVMS networking: connectivity



# OpenVMS networking: LAN failover

- Group NICS into LAN failover sets
- LLdriver presents “logical lan” devices

```
$ lncp define device lla/enable/failover=(ewa,ewc)
```

```
$ lncp define device llb/enable/failover=(ewb,ewd)
```

- One device in the failover set gives a layer of indirection

```
$ lncp define device lld/enable/failover=(ewd)
```



# OpenVMS networking: VLAN tagging

- VLdriver applies 802.1Q tags to packets

```
$ lncp define device vla/tag='scs_tag'/vlan_device=lla  
$ lncp define device vlb/tag='decnet_tag'/vlan_device=lla  
$ lncp define device vlc/tag='userip_tag'/vlan_device=llb  
$ lncp define device vld/tag='sysip_tag'/vlan_device=llc  
$ lncp define device vle/tag='bkpip_tag'/vlan_device=lld  
$ lncp define device vlf/tag='amds_tag'/vlan_device=lld
```

- Configure the switch ports to accept tagged packets

# LDAP / Windows AD - authentication

- ACME
- LDAP
- Configure LDAP / Windows AD to allow access from OpenVMS LDAP authentication agent
- Swap loginout image etc. (requires reboot – security)
- Configure ACME server to use LDAP agent
- Configure LDAP agent on VMS to have access to LDAP directory service / Windows Active Directory
- Configure “mapping of principals” if needed
- Set “extauth” flag in UAF

# LDAP / Windows AD – agent config (1)

```
sys$startup:LDAPACME$CONFIG-STD.INI
```

```
server = xd01w2k3.lab1.xdelta xd02w2k3.lab1.xdelta
```

```
port = 389
```

```
!
```

```
bind_dn = cn=svc_openvms_extauth,
```

```
        ou=OpenVMS ExtAuth,
```

```
        ou=XDelta Limited,
```

```
        dc=lab1,dc=xdelta
```

```
bind_password = <password_to_gain_access_to_ldap>
```

```
bind_timeout = 2
```

```
port_security = starttls
```

```
!ca_file = [directory]cacert.pem
```

```
!
```

# LDAP / Windows AD – agent config (2)

<cont...> sys\$startup:LDAPACME\$CONFIG-STD.INI

password\_type = active-directory

password\_update = replace

!

base\_dn = ou=Users,ou=XDelta Limited,dc=lab1,dc=xdelta

login\_attribute = sAMAccountName

scope = sub

filter = objectclass=\*

!

!mapping = <local / global> (or none if not defined)

!mapping\_file=SYS\$STARTUP:LDAP\_LOCALUSER\_DATABASE.TXT

!mapping\_attribute = description

!mapping\_target=VMSUsers.hp.com

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# LDAP / Windows AD - example

SYSTEM on RX2660 \$ set h 0

OpenVMS IA64 V8.4 on node RX2660

Username: butcher\_ca

Password:

Last interactive login on Thursday, 16-APR-2015 19:46:32.29

\*\*\*\* Logon authenticated by LDAP \*\*\*\*

BUTCHER\_CA on RX2660 \$

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# File sharing – CIFS (SAMBA) and NFS

- CIFS V1.2-ECO01 PS2\_13 is latest from HP
- TCPIP V5.7-ECO05A is latest from HP
- NFS V3 client
- Pathworks (Advanced Server) to CIFS migration

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# CIFS (SAMBA)

- Install and do initial configuration of CIFS
- Edit SMB.CONF to add shares and set values for your site
- Connect to domain (net rpc join)
- Start CIFS
- SWAT (if used) needs local webserver (CSWS)

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# CIFS (SAMBA)

- File formats:
  - File format conversion may be needed:  
\$ convert/fdl="record; format stream\_lf" <infile> <outfile>
- Security:
  - File ownership and protection mapping



# CIFS (SAMBA) – joining a domain

Must have SMB.CONF correctly set up with domain data (domain, security, servers, etc.) in [global] section of file

Join domain:

```
$ net rpc join --User=<domain admin> (not VMS username)
<password>
Joined domain LAB1_XDELTA
```

Check the join:

```
$ net rpc testjoin
Join to 'LAB1_XDELTA' is OK
```

*Hint: SMB.CONF - require “strongkey = yes”*

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# CIFS (SAMBA) – shares – SMB.CONF

Share specific sections in file: [sharename]

[xdelta]

comment = XDelta working area

path = xd\_tree\_toplevel:

writable = yes

read only = no

printable = no

browseable = yes

inherit owner = yes

vfs objects = varvfc

vms rms format = streamlf

vms ods5 volume = yes

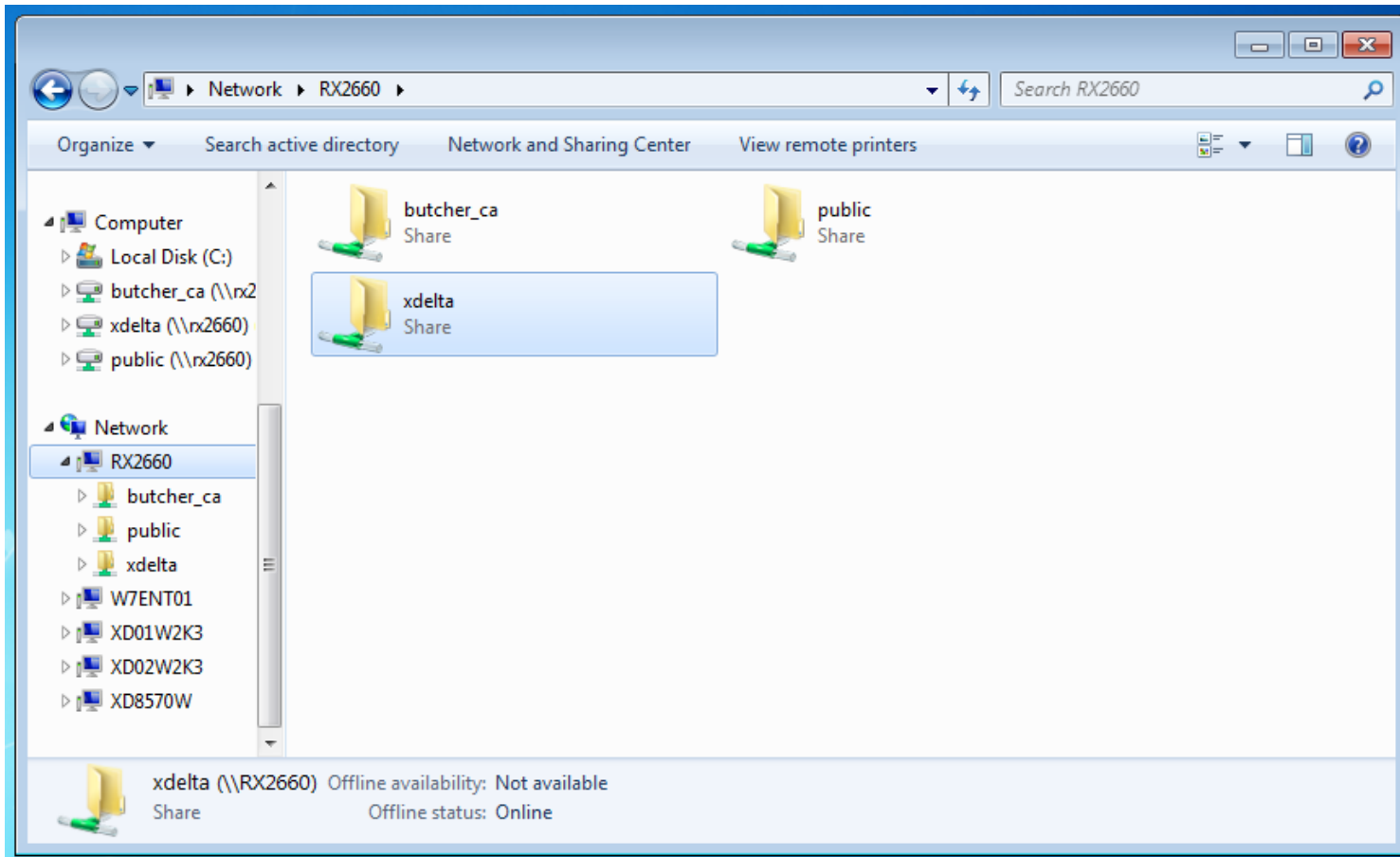
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# CIFS (SAMBA) – [homes] share

Special case: [homes] share

- Per-user “home” directories on server
- Needs domain access on both client and server
- WINBIND and username mapping
- See OpenVMS Technical Journal V14 for additional information

# CIFS (SAMBA) – the view from Windows 7



# CIFS - Alternative

- Use intermediate file server in Windows domain, so Windows clients work seamlessly
- Use NFS client on VMS to access file server
- Push files from VMS to file server (may need format conversion to stream\_lf)
- Lab example, just to prove the point:  
OpenVMS <NFS> Synology file server <SMB> Windows  
Separate traffic using VLANs for security

# NFS server and NFS client

- NFS V2 server
- NFS V2 and V3 client
- File format conversion may be needed:  
\$ convert/fdl="record; format stream\_lf" <infile> <outfile>
- TCPIP V5.7-ECO05A fixes a lot of NFS problems

# NFS server

TCPIP V5.7-ECO04 added some useful features:

- Identifier based access:

```
$ define /system TCPIP$UCP_LOAD_RESOURCE_ID_PROXY 1
```

- Read-only exports

```
$ tcpip add export "/test" /host=* /options=(read_only)
```

- Improved control of OPCOM logging
- See release notes for details (now ECO05A)

# NFS client

- Always use a separate copy of the XQP for NFS mounts, e.g.:

```
$ tcpip mount dnfsNNN: /host=<hostname / ip_address>/path="<path>" -  
  /uid=XXX/gid=YYY -  
  /structure=5/convert/system -  
  /processor=unique/acp=(dump,buffer_limit=1000000,page_file=500000) -  
  /transport=tcp/version=3 -  
  /sync=file_sync  
  /noadf -  
  <volume_name>
```



# Terminal access

- SSH (and TELNET)
  - Terminal emulator products:
    - PuTTY (freeware, with SSH)
    - Attachmate reflection
    - Ericon Powerterm (version shipped with VMS does not have SSH)
    - Etc.
  - ILO on Integrity Servers
- Serial port access (useful for ILO setup etc.):
  - Console servers (SSH and TELNET)
  - DECservers (no SSH / SSL)

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# Web servers

- CSWS (Apache)
- WASD
- OSU (Ohio State University)
  
- CSWS used for SMH (systems management home page), SWAT (SAMBA configuration web pages), etc.
- CSWS has sub-kits for PERL, PHP and TOMCAT (Java)

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# Monitoring

- TCPIP V5.7 provides SNMP monitoring capability
- Tools such as PTRG (Paessler) will collect and display SNMP data graphically over time
- T4 can monitor and record traffic flows per network interface (or pseudo-interface)
- SCACP
- LANCP
- DECnet-Plus
- TCPIP (\*nix like commands)

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# Availability Manager

- Uses AMDS protocol to interact with OpenVMS at driver level
- Can diagnose and bypass / fix a range of problems (with care!)
- New: VSI Availability Manager on 64bit platform

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# Future plans (VSI)

- New TCPIP stack with NFS V4, IPSEC, etc.
- Up-to-date SSL
- Up-to-date CIFS (SAMBA)
- Up-to-date CSWS (Apache), PHP, PERL, etc.
- Up-to-date JAVA and TOMCAT
- If you have a wish list, let us know!

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