

## Phase II – Information on District 51 – Any Device/Anytime/Anywhere Initiative

January 2012 – J. E. Percevault, Director of Technology

Lethbridge School District 51 has 20 schools and 8,800 kindergarten to grade 12 students in the City of Lethbridge.

District 51's ever greening project in 12 elementary schools will address upgrades to PCs, laptops, tablets, servers, printers, etc. for September 1, 2012 to ensure that the next generation provincial SuperNet fibre optics network is maximized – i.e. increased bandwidth to schools.

District 51 is currently building an "Any Device, Anywhere, Anytime Initiative" that connects many changing realities in technology costs and bandwidth costs in 2012:

- recent developments in the provincial SuperNet Context (i.e. much higher WAN to schools),
- affordable Cybera membership with Internet access to the Seattle Internet Exchange and sortly to the Toronto internet Exchange,
- dropping commercial Internet costs (i.e. per Mbps per month),
- dropping costs on consumer grade netbooks and tablets,
- dropping costs on 10 gE and gE Layer 2 and 3 switches,
- dropping costs on hexa-core servers and NAS devices, and
- our planned Phase II evergreening project targeted to elementary schools.

In addition, secondary schools will benefit from the central server design of Microsoft SharePoint hosting students' MySite accounts with high higher disk allocation per student account, and much higher bandwidth to the schools and to the Internet. Specific details on components of the District's initiative follow.

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Currently, District 51 has partnered with Scalable Software for the development of a mobile device management tool set for iOS 5, iPhones and iPads -- Asset Vision Mobile edition. Scalable has licensed Apple's APIs and will develop for summer 2012 MDM as an extension to the district's current WinInstall licenses on 4000 computers. Again, the district will complete a case study and a high definition video with Scalable on MDM in K-12. Information on Scalable:

<http://www.scalable.com/>

In August 2011, District 51 became the first K-12 partner with Cybera on alternate Internet provisioning via the Canadian Research Network (CANARIE) to the Seattle Internet Exchange (SIX) and shortly to the Toronto Internet Exchange (TorIX). Via BGB routing, regularly 66% of the District's Internet traffic is routed through Cybera. Information on Cybera's transit exchange:

<http://www.cybera.ca/services/better-faster-cheaper-internet>

The district's SuperNet connections will be upgraded to the following on the district's wide area network:

- 12 elementary schools; 4 outreach centres, 1 admin office – Full Duplex 100 Mbps – total 1.7 Gbps
- 7 secondary schools – 1,000 Mbps (gE) – total 7 Gbps
  - Maximum theoretical burst up – 8.7 Gbps for all schools
- NOC headend – 10,000 Mbps (10 gE)

District 51 is partnering with Axia to determine the capital costs and timelines for the network upgrade in spring 2012. Previously, District 51 has partnered with Axia on 100 Mbps demonstration for digital video streaming.

Axia SuperNet is a broadband fibre optics network servicing approximately 4000 nodes in the Province of Alberta. There are 62 K-12 school jurisdictions with a total of 2,200 schools. Information on Axia:

[www.axia.com](http://www.axia.com)

District 51 has been a long-term partner with Microsoft through the educational licensing on the Office productivity suite. Microsoft Server 2008, R2 is fully deployed on all print/file servers and all application servers. From September to November 2011, 60% of the District's Windows computers were upgraded to Windows 7 in the district's secondary schools. The remaining 40% will be upgraded commencing in September 2012 under the Phase II ever greening project. In December 2011, District 51 completed licensing extensions to the current Microsoft OS licenses to include Exchange 2010 upgrades and SharePoint 2010 upgrades with 1000 employee CALs and 7,850 student CALs (excludes kindergarten students). License agreements require annual renewals.

The licensing of SharePoint is targeted for student's personally owned devices – at school or at home with file access to a central repository. Students will have MySite account allocations:

- 2750 Elementary students – 2 GB
- 2500 Middle school students – 2 GB
- 2750 High school students – 2 GB ( 16 TB total)
- 450 teachers – 6GB
- 550 support staff – 6 GB (12 TB total)
- Operating system, server application, web sites and portals, wikis, blogs, shared communities for document storage – 5 TB
  - Total 33 TB

The district will implement a secure file submission of students' assignments to respective teachers via Exchange and SharePoint. Additional information on SharePoint:

<http://sharepoint.microsoft.com/en-us/Pages/default.aspx>

During Phase I, starting in September 2009, all district schools were equipped with Cisco's wireless access points – 270 1140 11.N/11.G series WAPs in 20 schools with more planned in Phase II on a needs basis. This investment was made in anticipation of supporting students' access to network services in district schools via WiFi – to the Internet, to Exchange, and to SharePoint MySite accounts. Information on the 1140 WAPs:

<http://www.cisco.com/en/US/products/ps10092/index.html>

In November 2011, under the district's Phase II capital funding, District 51 upgraded the previous FortiGate 1000 A firewall to the newer FortiGate 3140B firewall with companion FortiAnalyzer appliance. This upgrade was completed to accommodate real-time, proxy-based antivirus scanning on an Internet feed up to 1 Gbps. Planned Internet bandwidth increases are scheduled for spring 2012 to coincide with increased SuperNet bandwidth (i.e. Cybera at 1 Gbps; Shaw commercial Internet at 300 Mbps). Information on the 3140B firewall:

<http://www.fortinet.com/products/fortigate/3140B.html>

The District will install two HP three 3800 series switches to ensure that the district has the core switch bandwidth at the district's NOC – i.e. 10 gE port to the Internet, 10 gE ports to Share Point servers (SharePoint 2010, SQL/Index 2008, and NAS devices), and to the main Exchange server:

First Switch – on the stacking modules

- 1<sup>st</sup> 10 gE port – uplink/downlink the SuperNet 10 gE WAN link
- 2<sup>nd</sup> 10 gE port – Exchange 2010 server
- 3<sup>rd</sup> 10 gE port -- first HP SharePoint 2010 server – load balanced with 10 gE NIC
- 4<sup>rd</sup> 10 gE port – second HP SharePoint 2010 server – load balanced with 10 gE NIC

Second switch on the stacking modules

- 5<sup>th</sup> 10 gE port – first SQL/Index 2008 server 10 gE – load balanced with 10 gE NIC
- 6<sup>th</sup> 10 gE port – second SQL/Index 2008 server 10 gE – load balanced with 10 gE NIC
- 7<sup>th</sup> 10 gE port – NAS as the host for the SQL database with 10 gE NIC
- 8<sup>th</sup> 10 gE port – NAS as the real time backup of the SQL database

Third switch on the stacking modules

- 9<sup>th</sup> 10 gE port – NAS device for SQL log files
- 10<sup>th</sup> 10gE port – NAS as the real time backup of the SQL log files

The 3800 series HP switches are configured with 4 SFP+ 10 gE ports and proprietary cables (i.e. one the switch and on the servers) per 3800. The 3800's will be stacked together with the HP stacking modules and 4 stacking cables (320 million packets per second between the switches; 210 million packets per second on the backplane of each switch). Each 3088 has 48 1 gE ports in addition to host a wide variety of application servers at the district's NOC. Information on the HP 3800 48G-4SFP+ switch stacks:

[http://h17007.www1.hp.com/us/en/products/switches/HP\\_3800\\_Switch\\_Series/index.aspx](http://h17007.www1.hp.com/us/en/products/switches/HP_3800_Switch_Series/index.aspx)

Currently the district has two SharePoint 2007 servers each with two quad core processors, 32 GB of RAM and RAID 5, and the district has two Exchange 2007 servers with similar specifications. The

Exchange servers will be upgraded and the SharePoint 2007 servers will be rebuilt as high-end Terminal Servers for staff and student access – all but the Terminal Servers with 10 gE NICs. Two SharePoint servers and two SQL/Index servers will be load balanced in the final build alongside four NAS devices with real-time mirroring.

In late January, HP will be shipping the G7 servers and the district will take receipt of four additional G7 servers with two hexa-core processors, 48 GB of RAM and RAID1/450 GB Seagate drives to provide load balances SQL/Index 2008 servers. Additional information on the HP DL360 G7 X5650 2P 12GB-R P410i/1GB Svr with HP NC550SFP DUAL PORT 10GBE SERVER ADPTR:

<http://h10010.www1.hp.com/wwpc/ca/en/sm/WF25a/15351-15351-3328412-3328422-3328422-4142916.html>

District 51 has selected the LaCie 12big NAS for the central storage of students' and staff MySite Accounts and for SQL log files. The District specification follows:

1. 12, 3 TB SAS drives, RAID 5, 6 providing a net of 30 TB of storage to meeting the account allocations for students and teachers; 3 TB SAS drives are rated on the LaCie web site at 6 Gbps per second data transfer rate (i.e. NAS performance at 6 Gbps but connected via 10 gE to the HP switches)
2. Adding a second quad core processor – total two quad core processors
3. Adding 98 GB of RAM
4. Adding an HP half height 10 gE; connecting to the HP 3800 10 gE SFP+ ports with proprietary cable; as opposed to the fibre channel option due to the complexity of NAS to NAS replication under fibre channel
  - 7<sup>th</sup> 10 gE port – proposed NAS as the host for the SQL database with 10 gE NIC
  - 8<sup>th</sup> 10 gE port – proposed NAS as the real time backup of the SQL database
5. NAS to NAS replication via Windows Storage Server
6. SQL log file NAS devices will have the base 48 GB of RAM and 1 quad core processor

LaCie NAS information:

<http://www.lacie.com/ca/products/product.htm?id=10570>

In summary, the district has planned the wide-area network bandwidth and servers to accommodate the District's vision of accommodating student-owned devices at school or at home on a district "cloud based computing environment" that the district controls due the many legal issues centred on cloud computing (i.e. Officer of the Privacy Commissioner – Privacy Issues related to Cloud Computing). The district needs to be in control of its environment, and the new SuperNet wide area network bandwidth from secondary schools (gE) and from elementary schools (100 Mbps) provides the ability to centrally house the district's SharePoint, SQL/Index, NAS and Exchange servers with 10 gE at the district's network headend.

This is a complete redesign of the District's WAN network/server solutions as opposed to the traditional print/file servers in schools where students do not have access to from their homes via the Internet. The increased Internet bandwidth and dual services (Cybera and Shaw) will accommodate high evening and weekend access to the SharePoint/Exchange servers.