Collection of BCNET BGP Traffic

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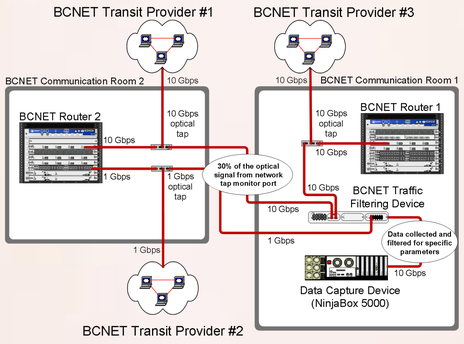
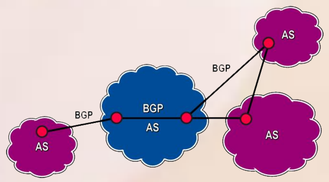
BCNET MAP



Physical overview of BCNET packet capture

- Primary BCNET backbone is a 10 Gbps Ethernet network with backup 1 Gbps links planned for rapid failover
- Data are sent to Traffic Filtering Device (Net Optics Director 7400) and to Data Capture Device (NinjaBox 5000)
- Optical Test Access Point (TAP) splits the signal into two distinct paths
- 30% of the split is sent to the Traffic Filtering Device that filters packets and sends filtered data to the Data Capture Device
- The transit providers are connected to BCNET via 1 Gbps and 10 Gbps network links

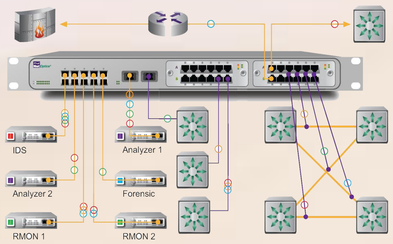
BORDER GATEWAY PROTOCOL (BGP)



Routing among BGP systems

- De facto Inter-Autonomous System (AS) routing protocol
- Operates over a reliable transport protocol (TCP)
- Exchanges network reachability information among BGP systems based on policy decision, shortest *AS_path,* and *Next_hop* router
- Employs the Best Path Selection algorithm to select the routing path
- Applies policies to the information contained in routing updates and accepts/rejects update information based on attributes

NET OPTICS DIRECTOR 7400

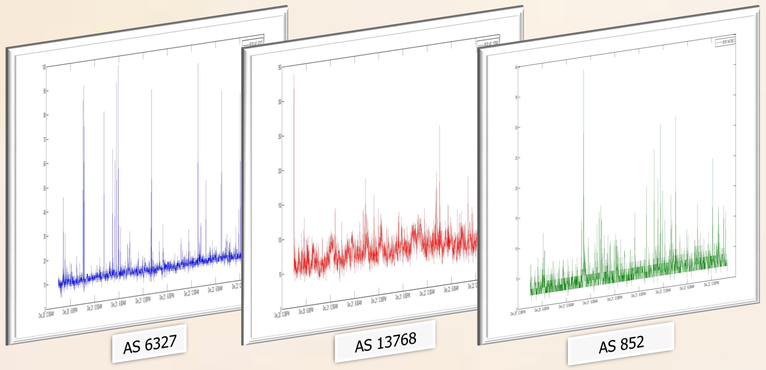


Net Optics Director 7400 application diagram

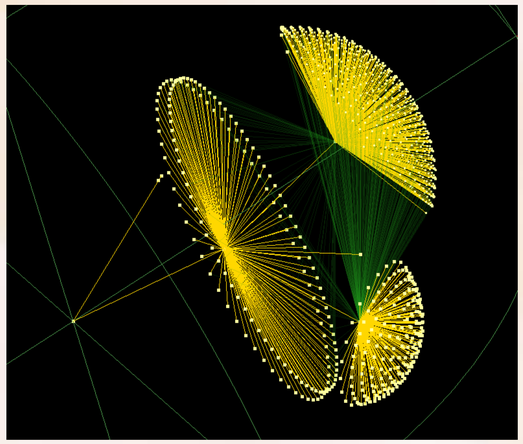
- The filtering device selects traffic of interest based on communication protocols, IP addresses, port numbers, and the virtual local area network (VLAN)

BCNET TRAFFIC COLLECTION

AS	Number of packets	Statistics (packets per minute)	Number of connections
6327	30,653	min: 4 max: 96 mean: 11	683
13768	512,672	min: 23 max: 336 mean: 63	588
852	511,820	min: 79 max: 645 mean: 177	155



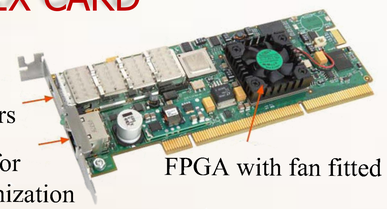
Traffic generated by the BGP update messages for the three BCNET transit providers



Walrus AS topology graph of the collected BCNET traffic

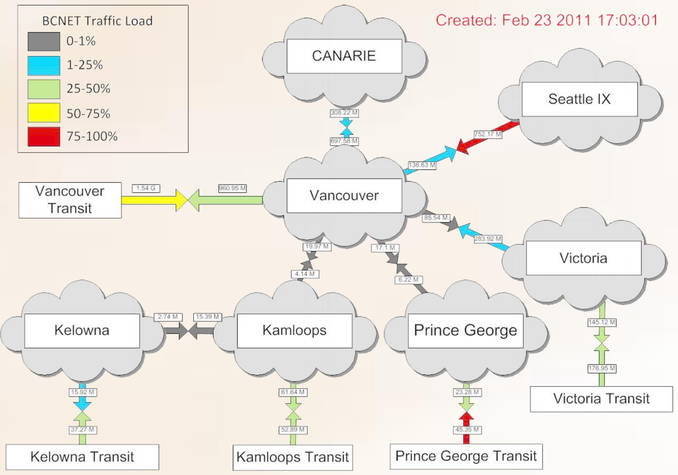
- Total of 230,424 BGP *update* messages were identified
- The AS topology graph consists of 982 nodes, 981 tree-links, and 441 non tree-links
- It is created using the value of the BGP *AS_path* attribute in BGP *update* messages
- The local AS number is added to the head of the list by a BGP peer when it advertises its prefixes to the next external BGP (eBGP) peer
- The graph links reflect a policy relationship between BCNET transit providers
- The centers of the three clusters correspond to BCNET transit providers with AS numbers 852 (Telus Advanced Communications), 6327 (Shaw Communications), and 13768 (Peer 1 Network Inc.)
- Clusters consist of 155, 683, and 588 AS nodes, respectively

ENDACE DAG 5.2X CARD



- Data Acquisition and Generation (DAG) is the main component of the Data Capture Device (NinjaBox 5000)
- DAG monitors and inspects traffic on 10 Gbps Ethernet LAN networks
- The card enables 100% packet capture at full line rates even on high-speed links operating at full line utilization
- Transfers up to 7 Gbps of traffic to software applications for further analysis
- DAG enables network managers to develop solutions that inspect security threats and measure network performance

BCNET TRAFFIC MAP



Net Optics Director 7400 application diagram

- British Columbia's network extends to 1,400 kilometers and connects cities of Kamloops, Kelowna, Prince George, Vancouver, and Victoria
- The map shows the traffic bound for CANARIE (Canada's Advanced Research and Innovation Network), the commercial Internet (Transits), and peering traffic at the Seattle Internet Exchange (Seattle IX)

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