Collection and Characterization of BCNET BGP Traffic

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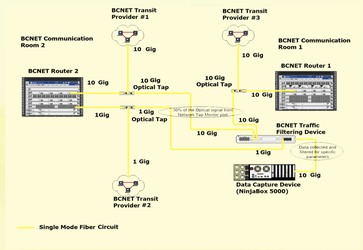
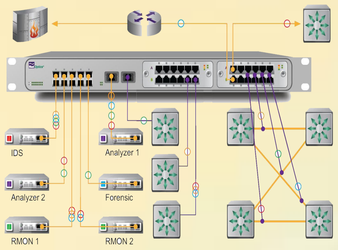
BCNET MAP



BCNET transit providers and routers

- BCNET transit providers are connected to routers via 1 Gig and 10 Gig network links
- Data are sent to Traffic Filtering Device and to Data Capture Device (NinjaBox 5000)
- NinjaBox 5000 relies on the Linux operating system to capture data at line rates using custom made network monitoring
- Optical Test Access Point (TAP) splits the signal into two distinct paths
- 70% of the optical signal is directed to a router for processing while remaining 30% is sent to the Traffic Filtering Device that filters packets and sends filtered data to the Data Capture Device

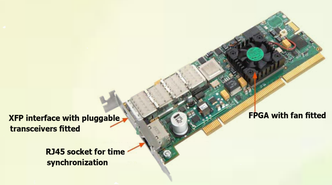
NET OPTIC NET DIRECTOR 7400



Traffic filtering device

- Directs traffic to monitoring tools and centralizes monitoring
- Selects traffic of interest based on protocols, IP addresses, ports, and virtual local area networks (VLANs)

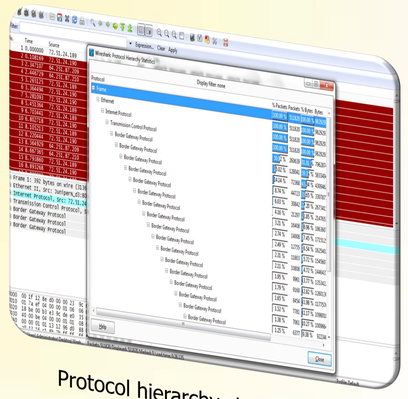
ENDACE DAG 5.2X CARD



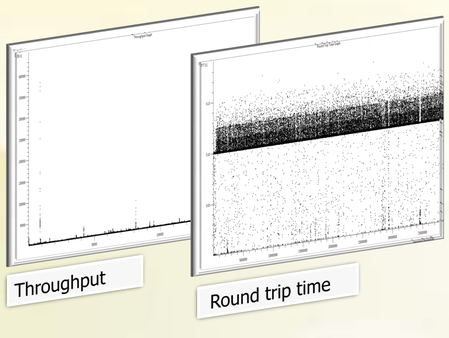
- Monitors and inspects traffic on 10 Gigabit networks
- Provides full line rate traffic capture, classification, and filtering
- Transfers up to 7 Gbps of traffic to software applications for further analysis
- Enables network managers to develop solutions that inspect security threats and measure network performance

WIRESHARK VIEW OF BCNET TRAFFIC

BCNET BGP packet capture

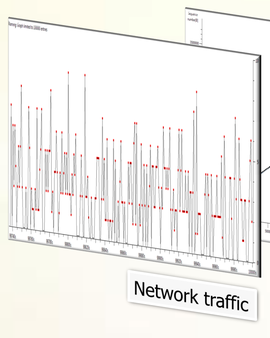


Protocol hierarchy statistics

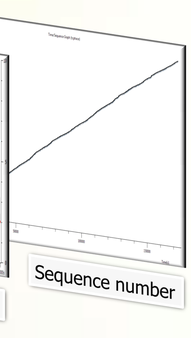


Throughput

Round trip time



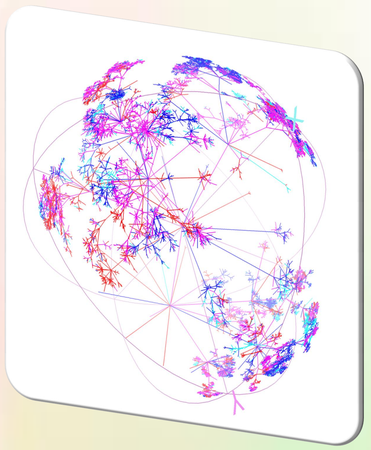
Network traffic



Sequence number

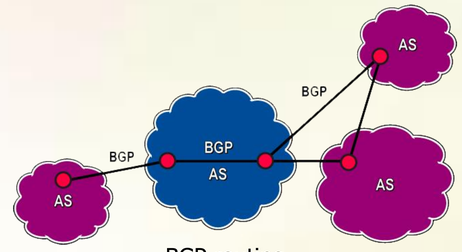
- Wireshark is a free, open-source packet analyzer
- Used for network troubleshooting, analysis, and development of communication software and protocols
- Widely used tool for monitoring, measurement, and analysis of network traffic

WALRUS GRAPHS



Directory tree and round-trip time measurements
(63,631 nodes and 63,630 links)

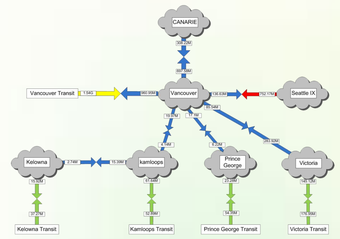
BORDER GATEWAY PROTOCOL (BGP)



BGP routing

- De facto Inter-Autonomous System (AS) routing protocol
- Operates over a reliable transport protocol (TCP)
- Enables subnets to advertise their existence
- Exchanges network reachability information among BGP speakers
- 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
- Determines good routes to subnets based on the reachability information and AS policies

BCNET TRAFFIC MAP



- Real-time network usage by BCNET members
- Shown are traffic bounds for the advanced network (CANARIE), the commercial Internet (Transits), and peering traffic at the Seattle Internet Exchange (Seattle IX)

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