CCNx Packet Processing on PARC Router Platform

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ABSTRACT

PARC's "Project 42" will demonstrate a routing platform that carries CCN over Ethernet payloads simultaneously with IP traffic. The CCN packet processing is performed on the intelligent line card data plane using embedded NPU and DPI processors. Content Objects are cached within the line cards to showcase the benefits of "in-network" caching. This routing platform enables early adoption of CCN into service provider networks.

Keywords

CCN, ICN, CCNx, Metis, Distillery, Caching, CCNoE

1. MOTIVATION

Since video is the primary component of Internet traffic, we chose to demonstrate native CCN (CCN over Ethernet) video being routed through PARC's "router platform" while running IP traffic as well. In addition, we chose simple video clients to demonstrate the low resource requirements of the CCNx transport stack.

2. OVERVIEW

Figure 1 illustrates the demo setup with following main components:

CCN and IP Video Server:

- Intel Xeon

CCN and IP Video Consumers:

- 10 "Raspberry Pi" clients
- VLC (Video LAN Client) plugin

PARC Distillery Software:

- Protocol Stack
- Metis forwarder

Data path:

- PARC's 400Gbps Routing Platform

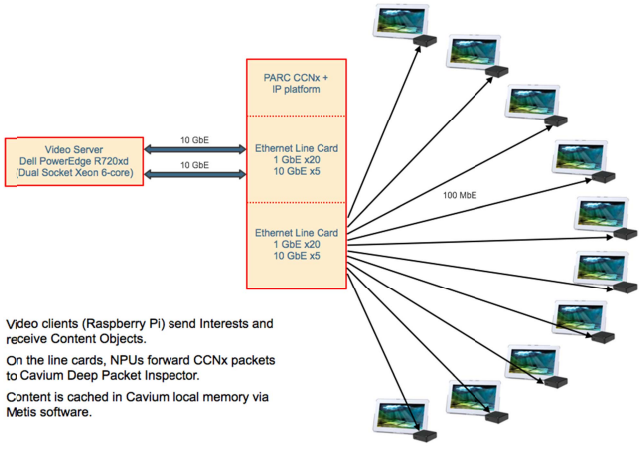

Figure 1. Demo Block Diagram

3. PARC Router platform

3.1 High level description

As shown in figure 2, the router platform is a 5-slot chassis that can house up to 4 network line cards within 6RU (Rack Units) of vertical space. Each line card slot supports 200GE of full duplex traffic. The system accepts up to two switch fabric controller cards that provide a non-blocking switch fabric between the line cards.

Following are the salient features of the platform

- CE Edge router with L2/L3/MPLS
- NSR/NSF architecture with ingress/egress QoS
- 6RU (4 line card) and 16RU (12 line card) models
- Line card family supports mix of 1/10/100GE

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Figure 2. PARC Router Platform

3.2 Router Data plane

Figure 3 illustrates the data plane for the router platform.

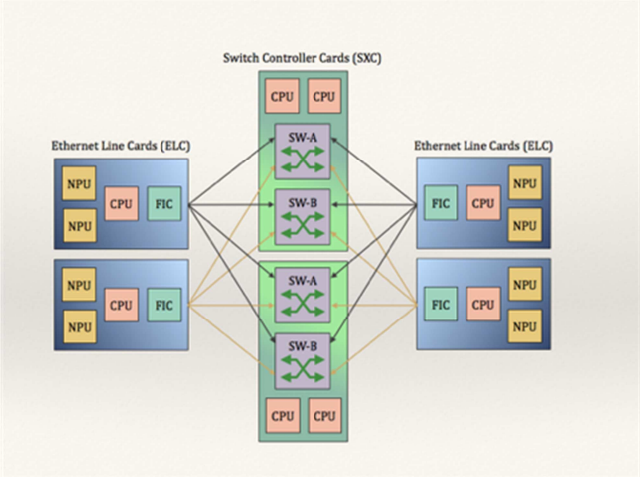

Figure 3. PARC Router Architecture

All packets come in on the line and are sent to NP4 on the line card. NP4 (in conjunction with Cavium Octeon) processes the packet appropriately and sends it to egress line card via fabric backplane.

3.3 CCN data plane

Figure 4 illustrates the CCN data plane for the platform. CCN traffic is identified by the 100GE NP4 network processor and sent to the Cavium Octeon on the line card where the Parc CCNx Metis forwarder is running. Metis forwarder sends the packet to the correct line card via NP4 and fabric backplane.

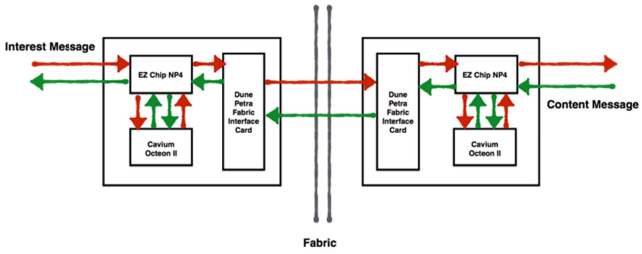

Figure 4. Router CCN Datapath

3.4 IP data plane

NP4 processes IP traffic on the line card without using Octeon and forwards the packet to egress line card through fabric backplane.

4. Demo details

The demo will show CCN video traffic getting processed by the router platform along with IP traffic. For CCN video, we are using tutorial_Server to serve the video and VLC with a CCN plugin to play the video on the RPi. In-network caching is shown and its benefits are demonstrated by removing the connection to the video server. For IP traffic, we are using VLC to stream the data from the server and VLC to play the video on the RPi.