



In-Network Computing Enablers for Extended Reality

draft-montpetit-coin-xr-01

Marie-José Montpetit, Ph.D.

NWCRG

IETF 103

5 November 2018

Draft Overview

- Review of the XR requirements
- What in-network computing brings to the networked XR challenge
- Open issues

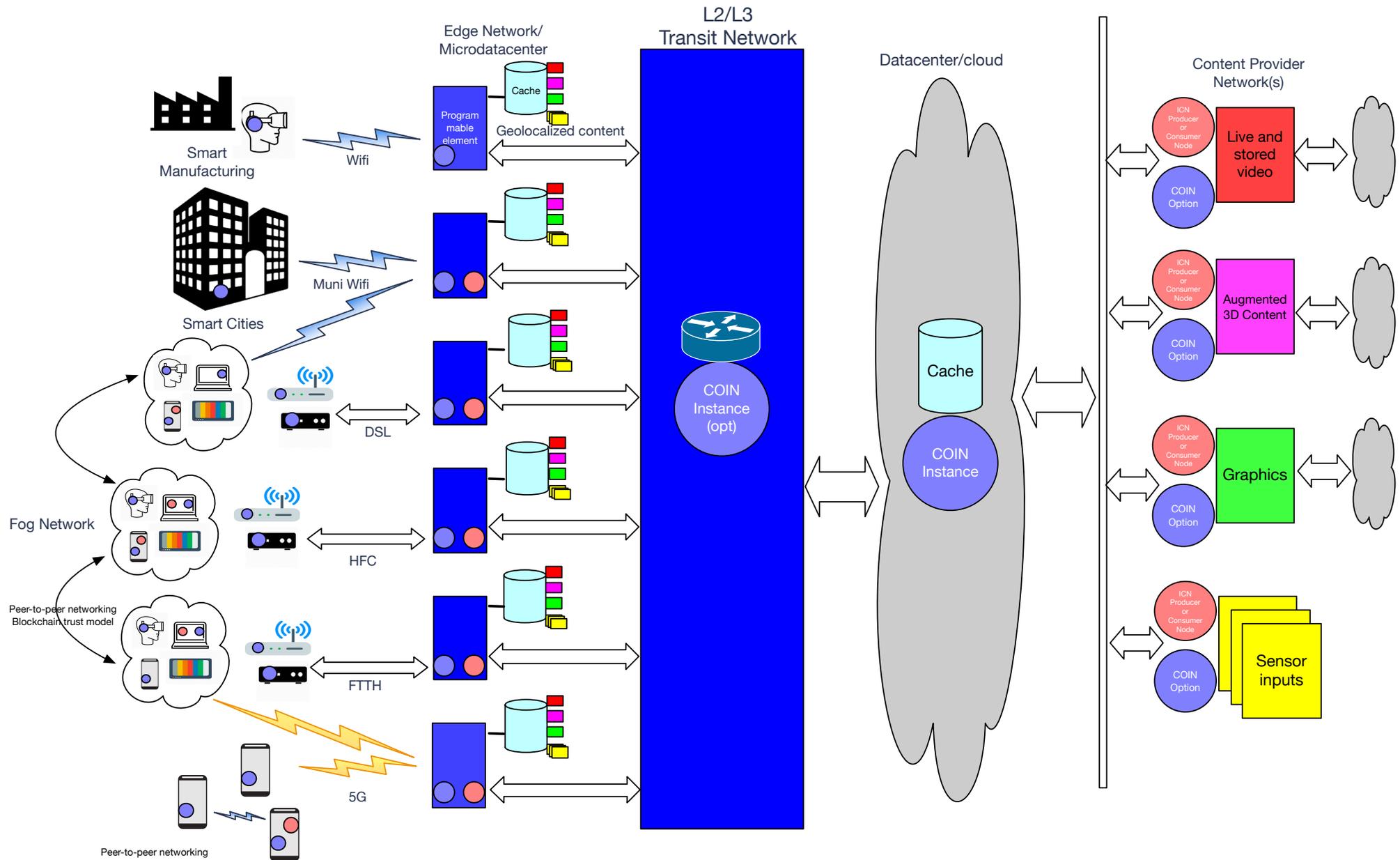
The Network XR Challenge

- The Multisource Multidestination Problem
 - Combine, video, Haptics Tactile Internet
 - XR= AR/VR/MR and 360o video
- Shared experiences across the network
 - Interconnected, distributed and federated XR nodes for global immersive experiences
 - Principles:
 - Allow joint collaboration in XR
 - Multi-view XR
 - Add extra streams (IoT) to experiences
- Challenges:
 - On time delivery of the multiple streams with rendering of the content across the multiple participants
 - Sensitivity to **packet loss and loss induced delay** especially for non video components
 - Low end to end delay/delay variation
 - Optimized caching and rendering

In-Network Computing and XR Summary

- Optimized location and type of resources for the multisource/multi-destination (mutiparty/multi-input) by using of AI/ML and advanced load balancing
- Distribute functionality between datacenters and edge
 - Functional decomposition of the XR elements
 - Federation of nodes to provide the required experience
 - Evaluation of local caching/micro datacenters with pre-rendering
- **Multicast distribution and processing as well as peer to peer to minimize delay and re-use capacity**
- Trend/ML based congestion control to favor AR and VR sessions
 - Joint learning algorithms across both data center, edge computers and goggle/glasses to allocate functionality and creation of semi permanent datasets and analytics for usage trending
- Dynamic allocation of control, forwarding and storage resources and related usage model
- **Performance optimization by tunneling, session virtualization and loss protection**

Architecture



Link to NWCRG

- Networked XR is very delay sensitive
- Erasure coding used to provide the packet erasure coding to maximize peer to peer and multipath efficiency and reduce the need for any form of retransmission
- Direct link to current in-network computing and programmable network elements

Next Steps

- Request comments from the COIN and NWCRG community and find co-authors from the XR community
- Generate a v1 for IETF 104 (Prague)
- (Eventually) have it adopted as a COIN RG Document

Join us for the COIN side meeting

Friday Nov. 9 from 10am to 12pm Bangkok time (GMT+7) in room Boromphimarn 3
(<https://datatracker.ietf.org/meeting/103/floor-plan>)

Remote access via the IETF Webex:

link: <https://ietf.webex.com/ietf/j.php?MTID=m4d74e60aecea8c08e8532decfa823a4a>

Meeting number: 642 054 101

Meeting password: y7evFtMt

marie@mimontpetit.com