Integration of Synchronous and Asynchronous Traffic in Residential Ethernet

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Residential Ethernet will provide the kind of isochronous and deterministic low-latency services for real-time streaming of audio and video.

Not just for high quality audio and video, Residential Ethernet will be an ultimate solution for supporting different level of upcoming applications in human life such as e-Health, ubiquitous sensor network, networked IT-robot, and so on.

Owing to its friendliness adopted widely, Residential Ethernet is superior to unify the heterogeneous wired and wireless networks by providing integrated isochronous and asynchronous frame switching.

Residential Ethernet will attract public attention not by just providing isochronous service, but by playing major role as a backbone.
Only managing to keep synchronization from an end to the other end is not enough.

As a backbone for heterogeneous wired and wireless network, Residential Ethernet should support more complex topologies and various mixture of traffic in sense of end-to-end.
A Case as a Backbone

Synchronous traffic
- each nodes generate synch paths and destined to other nodes with uniform distr.
- synch path holds for 10, 20, ...,100 time units varying to loads

Asynchronous traffic
- average frame size is 8,192bit and destined to other nodes with uniform distr.
- asynch frame load :100, 1000, 1250, .. 2500 frame/sec
Delay of Asynchronous Traffic: 1 hop

Graph showing the end-to-end delay (usec) vs. pkt/sec for different load conditions (load=10, load=20, load=40, load=60, load=80, load=100) and limited conditions.
Distribution of E2E Delay: 1 hop

- Synch Load: 10
- Synch Load: 100
- Bandwidth limited for Asynch Traffic
Distribution of E2E Delay at same avg delay

Synch Load : 60
Asynch Load : 2500

Bandwidth limited for Asynch Traffic
Asynch Load : 100
Challengeable Task with Care

Compare to conventional Ethernet handling prioritized asynchronous frames, needs to be more careful for relaying frames over multi-hops in Residential Ethernet.

It looks like
- not just a problem of point-to-point bandwidth allocation
- fairness problem, network wide optimality, congestion/blocking problem, ...
- problems already encountered in end-to-end network

Try not to reinvent, but make things go right

It might be not much different from Ethernet in view of MAC, but Residential Ethernet as a backbone should have something because of unavoidable concept on end-to-end and integration of synchronous and asynchronous traffic.
Summary

- Residential Ethernet will attract public attention not by just providing isochronous service, but by playing major role as a backbone.

- Compare to conventional Ethernet, needs to be more careful for relaying frames over multi-hops in Residential Ethernet.

- Although network wide control is out of scope, need to check possible proposals can provide tools to guarantee end-to-end bandwidth and optimality in view of network.