

# 802.1 & ResE

# Presentation Agenda

- Examine Top Level ResE Objectives
- Examine Existing and On-going 802.1 Standard Work
- Examine “Pent-Up” need to do something within 802.1
- Identify how ResE Objectives may fit into 802.1 Framework
- Explore Other 802.1 Standards MAY apply to ResE work.

Ref: Many items taken directly From Paul Congdon's presentations, in 802.1 public/docs2005 dir  
new-congdon-improved-queuing-0505.pdf  
new-congdon-improved-queuing-0705.pdf  
as well as other 802.1 presenters work (Mick, etc).

# ResE work in 802.1

		Current 802.1 Standards Work		
		MAC Services	Bridge Edge	Bridged Core
ResE Requirements	Forwarding			
	Admission Control			
	Time Sync			
	Profile, Recommended Practice			

# ResE Requirements

		802.1 Standards		
		MAC Services	Bridge Edge	Bridged Core
<b>ResE Requirements</b>	Forwarding	<ul style="list-style-type: none"> <li>• Queue/Flow definition, including Class/VLAN</li> <li>• Scheduler (beyond Strict Priority) enhancements.</li> <li>• Congestion Handling</li> </ul>		
	Admission Control	<ul style="list-style-type: none"> <li>• Establish controlled environment ("ResE Cloud")</li> <li>• Control Protocols (manage 802.1 controls, metering, scheduling, etc)</li> </ul>		
	Time Sync	<ul style="list-style-type: none"> <li>• Network timing awareness to provide                             <ul style="list-style-type: none"> <li>– Bridge scheduler consistency (allow for support of "bounded delay")</li> <li>– End-point application sync</li> </ul> </li> </ul>		
	Profile, Recommended Practice	<ul style="list-style-type: none"> <li>• VLANs, Class Usage</li> <li>• Multi-path/STP/Link Aggregation,</li> <li>• Rate Control in MAC (i.e. 802.3 Congestion Mgmt)</li> <li>• Management of scheduling queues</li> <li>• Class (priority bits) regeneration</li> </ul>		

# Objectives Reference from July (deleted before PDF)

## **Additional objectives which were out of scope for 802.3**

- Bridging between 802.3, 802.11 and 802.15.3 (and other 802 MACs) preserving QoS
- Compatible with 802.1q
- No streaming frames dropped, bandwidth is reserved
- Default policy is first-come, first-served by request
- Network will automatically reclaim allocated but unused resources
- Support arbitrary topologies within reasonable limits (802.1d)

# Objectives Reference from July (deleted before PDF)

## **Proposed 802.1-based objectives** (from May meeting)

- **Guaranteed QoS attributes for streams over small diameter (home-sized) network with 7 Ethernet hops max**
  - smaller number of hops for MACs with more inherent latency
- **QoS attributes are:**
  - latency less than 2ms
  - guaranteed bandwidth (assignable per stream)
  - packets are not dropped
  - once a stream is established, its performance is guaranteed
- **Timing synchronization between DTEs with low jitter and approaching zero wander**
  - specs TBD

# Existing 802.1 Features

		Current 802.1 Standards Work		
		MAC Services	Bridge Edge	Bridged Core
ResE Requirements	Forwarding	1-8 Traffic Classes	Metering of Flows by D-MAC, VLAN, CoS (Q) Re: Meter Algorithm (MEF5), No Meter Config. Drop based on queue depth (Q.8.6.7) Drop Precedence (AD) Strict Priority (D.7.7.4) scheduling only. Egress Queues (D.7.7.3) No latency spec (except aging out old frames) LLDP-MAC Discovery (AB)	
	Admission Control	802.3 Congestion Mgmt TF, 802.1 (?)	End-point Authentication (X) only	
	Time Sync			
	Profile, Recommended Practice			

# Recommended 802.1 Features (From May/July 2005)

		Current 802.1 Standards Work		
		MAC Services	Bridge Edge	Bridged Core
ResE Requirements	Forwarding	<ul style="list-style-type: none"> <li>Egress shaping (also 802.3 CM TF)</li> </ul>	<ul style="list-style-type: none"> <li>Egress shaping &amp; Scheduler Definition - Min &amp; Max BW guarantees for Egress classes</li> <li>Ingress meter configuration specification.</li> <li>Scheduler Enhancement – Deficit WRR, rate controlled priority queuing (Q.8.1.6, rewrite 8.6.8 to add scheduler algorithm &amp; param.)</li> </ul>	
	Admission Control			
	Time Sync			
	Profile, Recommended Practice			



# Recommended ResE Features

		Current 802.1 Standards Work		
		MAC Services	Bridge Edge	Bridged Core
<b>ResE Requirements</b>	Forwarding	<ul style="list-style-type: none"> <li>Egress shaping (also 802.3 CM TF)</li> <li>Egress metering ?</li> </ul>	<ul style="list-style-type: none"> <li>Egress shaping &amp; Scheduler Definition - Min &amp; Max BW guarantees for Egress classes</li> <li>Ingress meter configuration specification.</li> <li>Scheduler Enhancement – Deficit WRR, rate controlled priority queuing (Q.8.1.6, rewrite 8.6.8 to add scheduler algorithm &amp; param.)</li> </ul>	
	Admission Control			
	(Protocol Work)	Discovery	Discovery, GARP enhancements,	
	Time Sync	MAC Services Enhancements	Timing Proxy for end-station??	TimeSync support.
Profile, Recommended Practice	CE end-point profile	Bridge profile. etc.		

# Paul's Slide from May – to be deleted before PDF

## Recommended Modifications



1. Egress minimum bandwidth guarantees
  - Define 8 parameters per port as minimum bandwidth percentages
2. Egress rate limits
  - Define 8 rate parameters per port that match metering rate definitions
3. Metering rate definitions
  - Define way to represent rate
  - Define quantum over which rate is measured

**COM.**

# Anticipated Changes to 802.1

- **Primary Feature Add**

- Q - add an additional item to 8.1.6 that explains that queue scheduling configuration supports traffic expediting
- Q - rewrite 8.6.8 to describe new parameters and scheduling algorithm
- Q - admission control (ingress metering)
- Q - GARP extensions to add ResE effected features (e.g. reservation)

- **Administrative Edits/Add (consistency)**

- Q - Update 12.6.3 to include parameters as managed objects
- Q - Update A.5, A.14 and A.16 PICs for new optional capabilities
- Q - Update Annex G to incorporate new scheduling algorithms
- Q - Consider new sub-clause in Annex G to describe use cases

# Possible Additions to 802.1

- **Primary Feature Add**

- TimeSync (MAC Services, Forwarding)
- Discovery (LLDP annex or something else, or outside)
- DRM considerations (802.1X, MAC Security (AE/AF), or outside).
- ResE Profile Annex (with attention to usability for other purpose)

- **Administrative Edits/Add (consistency)**

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# Other 802. Std Applicability to ResE

Std	Abb.	Comment wrt ResE
802.1AB	LLDP	Discovery (TLV exchange) – may or may not be used
802.1ad	Provider Bridging	Not Applicable (But its Q additions, e.g. drop precedence are complementary).
802.1AE/af	MAC Security	Introduces incremental & predictable delay (block cipher) Not Applicable, unless upper layer DRM finds this attractive.
802.1ag	Conn Fault Mgmt	Complementary but not mandatory
802.1aj	Two Port MAC Relay	Introduces incremental delay (and presumed predictable delay). May effect time-sync process.
802.1ak	M.R. GARP	Great!
802.3	Auto-neg	May be used for discovery. Otherwise, N/A.
802.3ad	Link Agg	Complementary but load-balancing scheme the Profile document.
802.3ar	Cong. TF	TBD.
802.3as	Frame Exp	May be used in Time-Sync work, if encapsulation used.

# Task Force Work and Discussions

- Forwarding Work – Support and Proceed with current improvement effort
- Admission Control – Two parts
  - Features - parameter definition
  - Protocol
    - Registration, Path BW Mgmt, Multicast Group Mgmt
    - Discovery, Feature Negotiation
- TimeSync – Further Work
  - Time Stamping, Correction, Ctrl Protocol
  - Value proposition → distill features down to L2 and above
  - Initially A part of Profile/System Architecture work
- Profile, Recommended Practice,
  - System Architecture work
  - Draft 802.1 Profile Annex
  - Seek home for above L2 publication

Thank You

# Overview

- Std map
  - end point and network demarcation
  - end point
    - MAC services map
    - egress metering/queue mgmt
    - timing (?)
  - Network/Bridge
    - Bridge Performance related
    - Bridge Queue related
    - ingress metering/enforcement
    - timing (?)
  - Network/Infrastructure
    - path BW mgmt/registration