Dynarc

”RPR: Requirements and common grounds”

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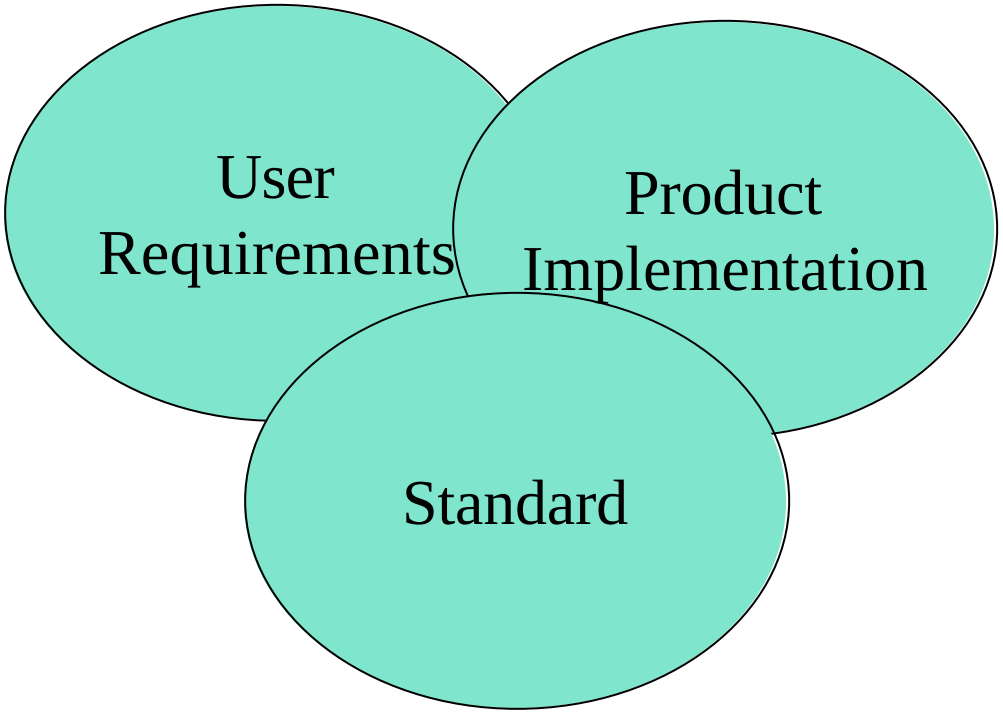
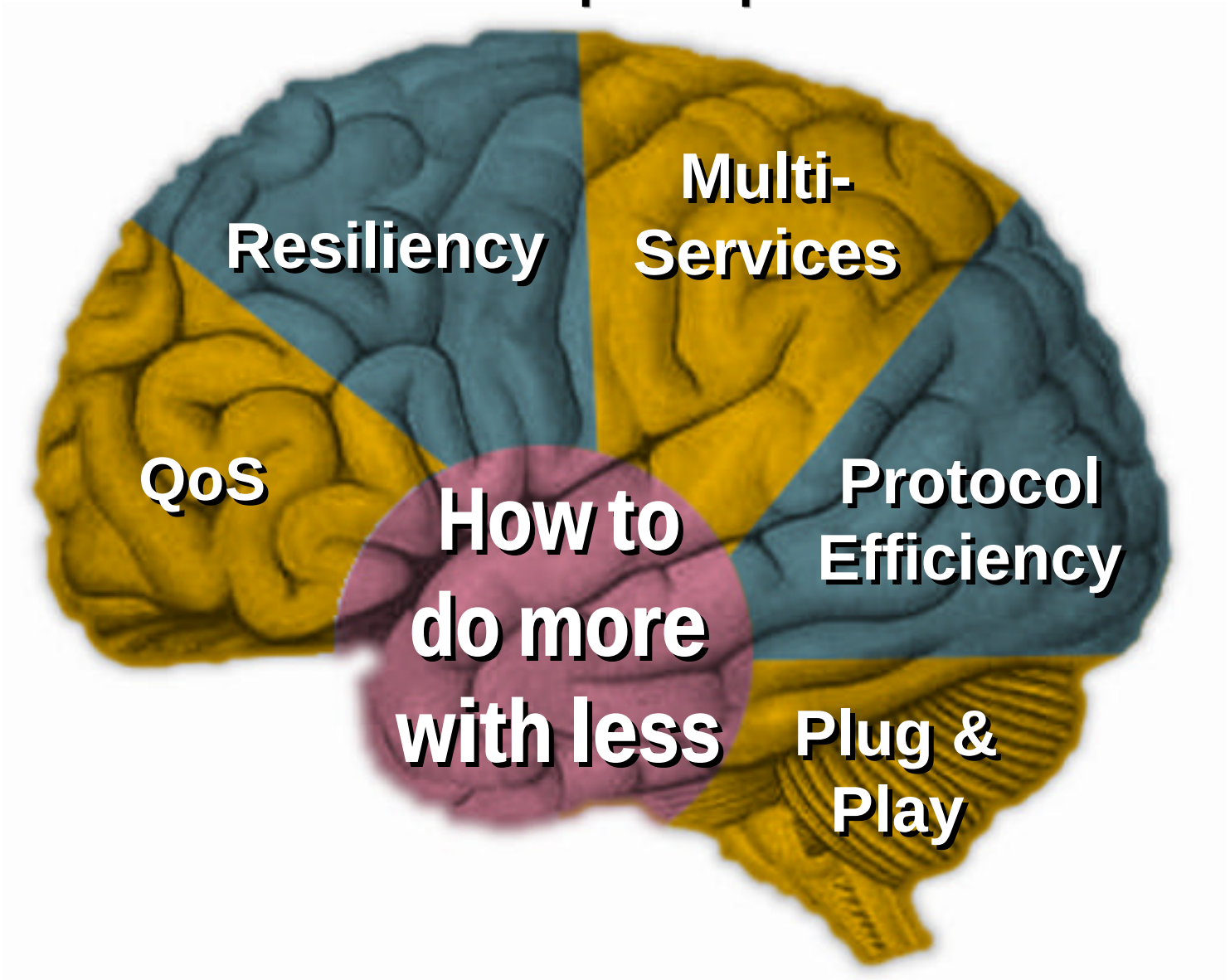
There is no Nirvana !

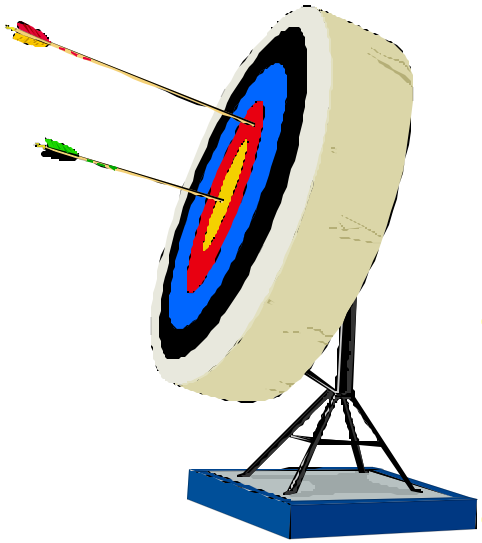


We don’t do a standard for one customer or one product implementation

An IEEE 802.17 participant brain



Standardization Strategy



- Let's have a methodology …
  - … where there is no looser !
- We don't need to preclude …
  - … preclude cut-through vs. store and forward
  - … preclude steering vs. wrapping
  - … preclude QoS vs CoS
  - …
- We need an evolving standard with room for expansion
- We need to define a version 1.0 and optional modes
- We need V1.0 NOW

So, what is on V1.0 list ?

- We need to build a list of metrics and answer YES(V1.0), YES(future), NO(never)
- Metrics is comprised of:
  - Frame format
  - Fairness / Bandwidth / QoS / traffic management
  - Protection / Resiliency / traffic engineering
  - Operation / plug and play / auto topology
  - Network management / service provisioning

RPR Packet Format

48 bits	48 bits	Type+TTL+TAG+	2bytes	Data

RPR shim is inserted in an Ethernet Frame
It has a RPR type, TTL, Label, …

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RPR Control Messages

- How do they circulate?
  - Next Hop
  - Point to Point
  - Multicast / Broadcast
- What are they controlling?
  - Topology information / discovery / change / request
  - Bandwidth Management / CAC / provisioning
  - FCAPS and remote monitoring
- Status Collection Messages
  - BER
  - Actual load
  - …

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Multi-service capability (1)

- Multi-service support best effort, CoS-Class of Service and QoS-Quality of Service traffic
- Multi-service is essential for
  - Premium services
  - Time sensitive traffic
  - Particularly the integration of voice and multimedia
- Multi-service requires Controlled Delay and Jitter
- Data plane (forwarding) must be designed to support
  - Policing (and customer separation)
  - Advanced buffer management
  - Advance congestion control
  - Per port, per priority, or per aggregated flow queuing
  - Advanced scheduling and shaping …

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Multi-service capability (2)

- Control plane must be designed to support:
  - Call acceptance control (CAC) equivalent
    - Insufficient resources - busy signal
    - By flow or aggregation of flows
  - Constraint based path computation
    - Forwarding rules between east and west
    - With or without MPLS control gateway
  - Qos routing protocol
    - flood information on available capacity and other constraints like protection
    - RPR local + MPLS OSPF(TE) or IS-IS(TE)
  - Explicit path signaling
    - establishes computed path and protected path
    - RPR steering + MPLS RSVP-TE or CR-LDP

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RPR response to congestion

- Congestion in a node on the ring can be remedied immediately by reallocating spare bandwidth with the control plane though token distribution
- If a node is underdimensioned regarding its throughput
  - Another node can be introduced next to it on the ring
  - The backplane can be upgraded to double its processing capacity
- If the concerned ring is close to its maximum throughput
  - The ring can be segmented into two rings with maximum throughput in each
  - The link speed can be upgraded on-line by replacing the interface cards, thus increasing the ring throughput with a proportional factor

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RPR Channels

- Three variations: Unicast, Multicast, Broadcast
  - Created by a control message
  - Control channel is bi-directional
  - Switch nodes create channels on behalf of the sender
  - A multi-hop channel must get OK from every switch along its path
  - Portion of the bandwidth
  - Synchronous between the sender and the receiver
  - Virtually no loss of data

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Token Distribution

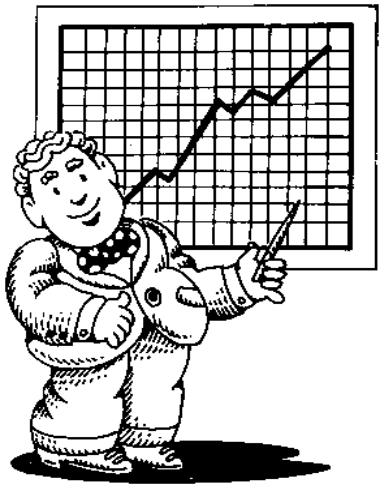
- Initial distribution at boot process
  - Fairness distribution between nodes for token pool
  - Initial distribution is SRP ignorant: bandwidth / nodes
- Each node use token pool to allocate token to channels
- Channels are SRP aware: allocated token is local and not global
- Local token is point to point
- When token pool is used then token requests can start from other token pool

RPR Technology Benefits

RPR Ability to Reduce Costs

RPR Ability to Grow the Business

- Capital Procurement
- Change
- Resilience
- People
- Performance



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There is two ways to do RPR standard:

Like a Plumber

Like a Designer