

DetNet WG

IETF #100, Singapore

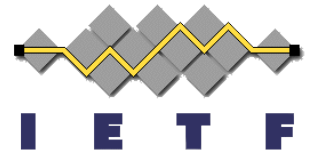
Use Cases Draft

Thursday, November 16th, 2017

Ethan Grossman, editor

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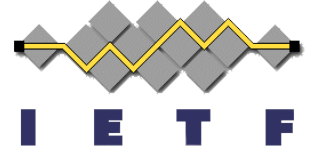


Contents

- Updated Use Case draft
 - draft-ietf-detnet-use-cases-13
- Goals, Future plans
- Status – Three new use cases
 - No new common themes needed!
- Common Themes (brief review)
- Overview of new use cases

Use Case Draft Goals

- Provide industry context for DetNet goals
 - What are the use cases?
 - How are they addressed today?
 - What do we want to do differently in the future?
 - What do we want the IETF to deliver?
- Highlight commonalities between use cases
- Yardstick for functionality of any proposed design
 - To what extent does it enable these use cases?
- This DetNet use case draft explicitly **does not**
 - State specific requirements for DetNet
 - Suggest specific design, architecture, or protocols



Use Case Draft Future Plans

- Continue to review the ongoing architecture and design drafts to identify cases in which they may not support user needs (as described in the Use Cases draft)
- Adapt and clarify the Use Cases draft to be in alignment with practical considerations of the proposed architecture and design

Use Case Draft Status

Three New Use Cases

- Private Blockchain

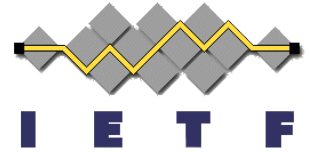
by Daniel Huang

- Mining

by Diego Dujovne and Xavier Vilasojana

- Network Slicing

by Xuesong Geng



Common Themes (1/2)

- Unified, standards-based network
 - Extensions to Ethernet (not a "new" network)
 - Centrally administered (some distributed, plug-and-play)
 - Standardized data flow information models
 - Integrate L2 (bridged) and L3 (routed)
 - Guaranteed end-to-end delivery
 - Replace multiple proprietary deterministic networks
 - Mix of deterministic and best-effort traffic
 - Unused deterministic BW available to best-effort traffic
 - Lower cost, multi-vendor solutions

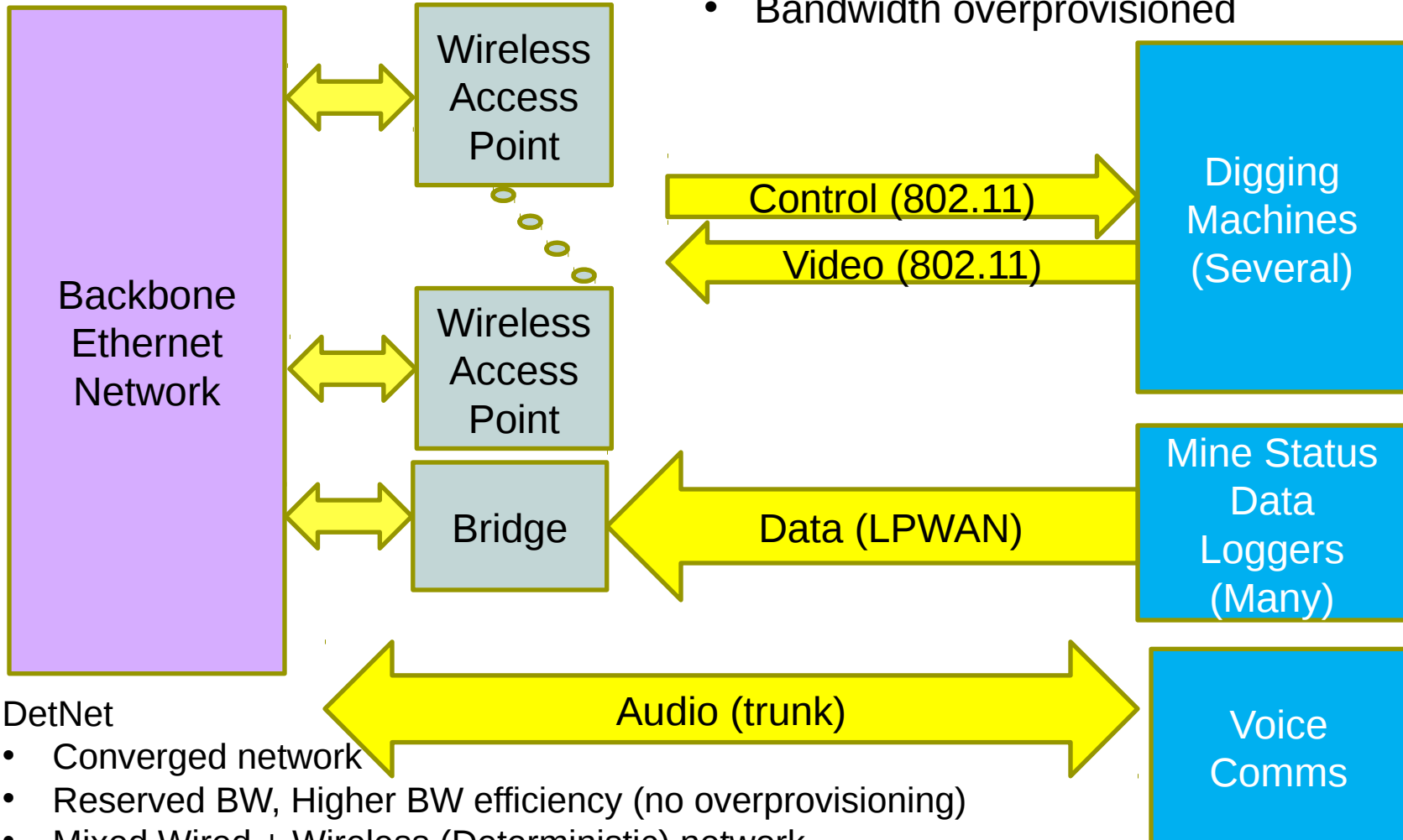
Common Themes (2/2)

- Scalable size
 - Long distances (many km)
 - Many hops (radio repeaters, microwave links, fiber links...)
- Scalable timing parameters and accuracy
 - Bounded latency, guaranteed worst case maximum, minimum
 - Low latency (low enough for e.g. control loops, may be $< 1\text{ms}$)
 - Ability to create symmetrical path delays
- High availability (up to 99.9999% up time, even 12 nines)
 - Reliability, redundancy (lives at stake)
- Security
 - From failures, attackers, misbehaving devices
 - Sensitive to both packet content and arrival time
- Deterministic flows
 - Isolated from each other
 - Immune from best-effort traffic congestion

Mining Use Case

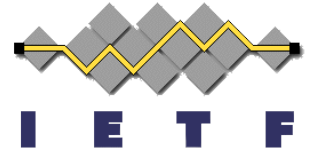
Today

- Reliability via retries
- Latency tolerated
- Bandwidth overprovisioned



DetNet

- Converged network
- Reserved BW, Higher BW efficiency (no overprovisioning)
- Mixed Wired + Wireless (Deterministic) network
- Low Latency

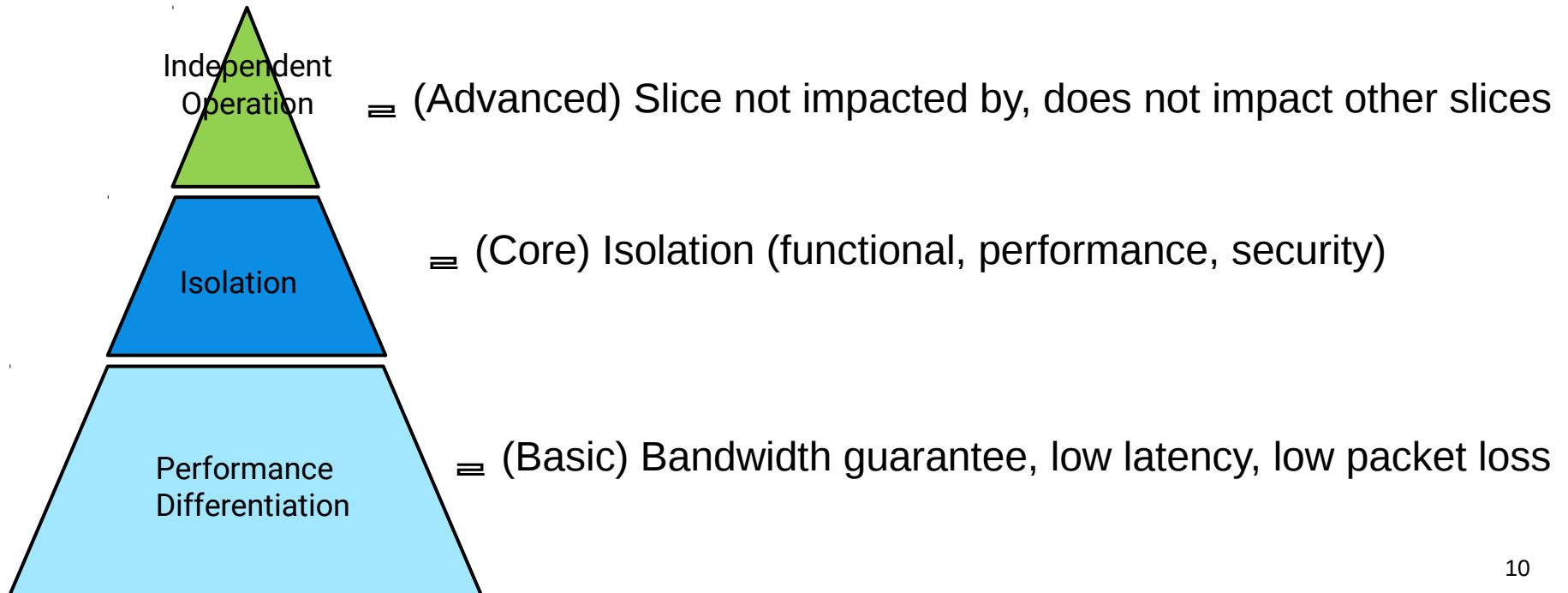


Private Blockchain Use Case

- ❑ Private Blockchain (corporate network)
- ❑ DetNet can
 - Accelerate consensus process
 - Facilitate point to multi-point traffic (vs. App layer)
 - Guarantee transport latency, negligible packet loss
- ❑ Private Blockchain Asks
 - Layer 2 and Layer 3 multicast of blockchain traffic
 - Bounded, low latency
 - Negligible packet loss
 - Coexistence of blockchain and IT traffic
 - Scalable network with distributed control entities

Network Slicing Use Case

- **Network slicing** divides one physical network into multiple logical networks. Each slice, corresponding to a logical network, uses resources and network functions independently from each other.
- Network Slicing is a core feature of 5G defined in 3GPP (under development)



DetNet in Network Slicing

Isolation: Functional, Performance, Security

Provide bandwidth reservation and flow isolation

Implemented with

- Resource reservation for DetNet flows
- Queuing management (shaping, scheduling)

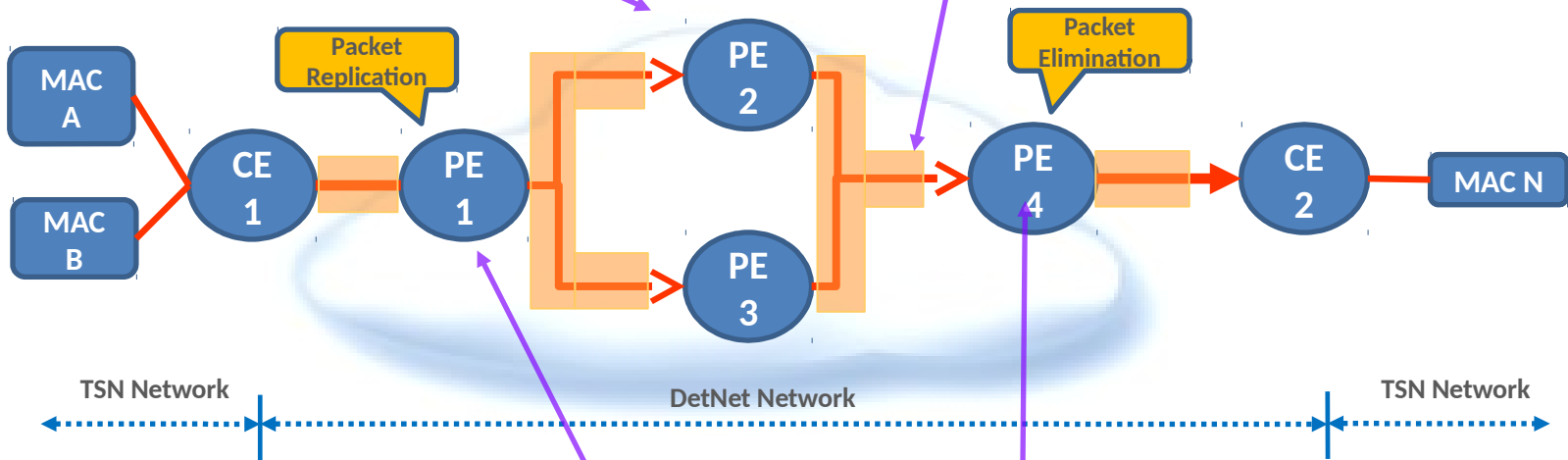
Performance Differentiation: Service Customization

Specify explicit routes to control

- End-2-end latency
- Number of redundant trees

Implemented with

- Segment Routing
- RSVP-TE



A Network Slice with DetNet

PE - Provider Edge Router

CE - Customer Edge Router

MAC - Media Access Control (address)

Performance Differentiation: High Reliability

Avoid packet loss due to random media errors and equipment failures

Implemented with

- Packet replication and elimination