TVR (Time-Variant Routing) Requirements

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Intention of this Internet-Draft

- This document introduces requirements for TVR computations to improve network communication and resource efficiency.

- From the TVR Charter “This document should include TVR definitions, requirements, notes, rationales, and examples.”

- Our intention is the requirements are derived from the Use Case I-D and other contributions to provide input into the TVR Information Model and Data Model, Internet-Drafts.
Expectation of Time-Variant Networks

• Time-Variant Routing (TVR) refers to calculating a path or subpath through a network where the time of message transmission (or receipt) is part of the overall route computation
  • TVR-based network topologies may be either
    • Systems with intrinsic topological changes
    • Systems with occasional topological changes
  • Topology based on nodes with limited resources or connectivity, this could be based on design or environment
  • Identification of links and when they are available at specific times to help nodes preserve resources
  • Costs of a link may change over time and be dependent on financial or environmental costs
  • Mobility may be the root cause of link/adjacency connectivity, but cause is not significant to the representation or processing of the topology

• Fundamentally, loss of links or nodes is expected
Scope for the Requirements I-D

- Define topology model components for resource scheduling
  - Using existing IETF technology where possible, and/or extending for TVR:
    - Proxies, Nodes, Termination Points, Links, Layering
- Discuss requirements from the use case scenarios, including:
  - Resource Preservation
  - Operating Efficiency
  - Dynamic Reachability
- Provide a succinct description of TVR networking, including agreement and definitions for key TVR terms
  - Visibility
  - Locality
  - Temporality
  - Time-Variability
  - Time Horizon
  - Time Precision
  - Periodicity
  - Continuity
  - Interpolation
Progress from 02 to 03

• Time-variant network constraints may be based on dynamic factors that will influence how the network is managed and how network resources are scheduled.

• These constraints are influenced by real-time data and can vary significantly depending on multiple factors.
  • **Predicted Traffic Demand**: Network usage patterns fluctuate throughout the day, with peak times typically occurring during business hours and in the evening.
  • **Energy Efficiency**: The energy consumption of network equipment can be optimized based on the current and planned load.
  • **Weather Conditions**: Weather can impact network performance, especially for wireless and satellite communications.
  • **Network Maintenance and Upgrades**: Scheduled maintenance or unexpected faults can introduce temporary constraints. By planning maintenance activities during off-peak hours and having real-time monitoring systems to quickly detect and address faults, network downtime can be minimized.

• Document updates also include:
  • Readability, English and text improvements
  • Polishing Security Considerations
Mission Accomplished?

• Document is stable
• No open issues in GitHub
  • https://github.com/danielkinguk/tvr-requirements/issues
• Have we met the objectives?
  • Yes, but...
  • Charter states:
    • This document should include definitions, requirements, notes, rationales, and examples
• The current version of the document includes:
  • Section 4.1. Operating Efficiency Use Case
  • Do we need more examples?
Summary and Next Steps

• Does the WG agree with the authors that the document is stable?
  • Authors request more reviews and comments
  • Assuming others agree the document is stable, addresses the Charter requirements, and is complete...

• Close document and request WG Last Call
  • We could plan to do before IETF 121