TVR (Time-Variant Routing) Requirements

draft-ietf-tvr-requirements-03

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Intention of this Internet-Draft

Network Working Group
Internet-Draft
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Abstract

Time-Variant Routing (TVR) refers to the calculation of a path or subpath through a network where the time of message transmission (or receipt) is part of the overall route computation. This means that, all things being equal, a TVR computation might produce different results depending on the time that the computation is performed without other detectable changes to the network topology or other cost functions associated with the route.

This document introduces requirements where TVR computations could improve message exchange in a network.

- 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, <u>loss of links or nodes is expected</u>

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 Efficienc**y: 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