

TVR Technology Gaps, and Potential Working Group Topics

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Routing protocols and their environments

There are (in general) two types of environments that IETF routing protocols are designed for:

- Fixed environments, where everything is expected to stay reasonably stable
- Ad-hoc environments, where connectivity and adjacencies are dynamic
 - This is often referred to as a Mobile Ad-hoc NETWORK (MANET).

Fixed environments

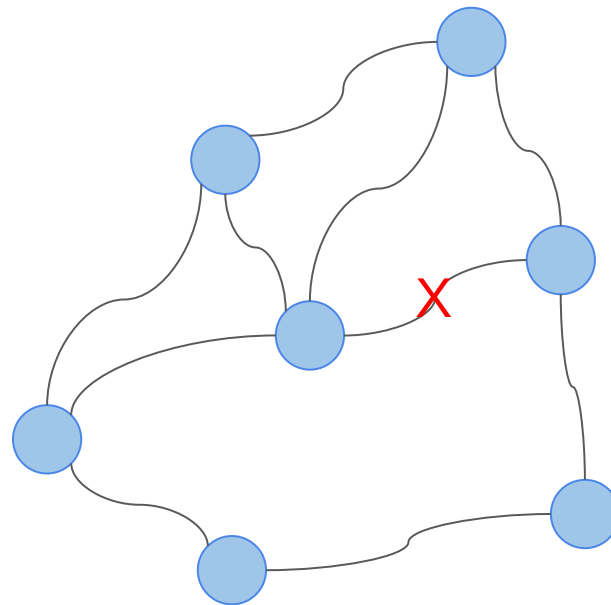
General assumptions:

- Nodes do not move within the topology
- Links between nodes may break
- Network service is maintained via **reactive** rerouting
- Links are expected to be restored, and **proactively** monitored

Protocols are tuned for this, e.g.: BGP, OSPF, ISIS, BFD

Key issues when applied to TVR use-cases:

- Reactive rerouting results in loss even for expected outages
- Proactive monitoring unnecessarily wastes (scarce) resources



MANET environments

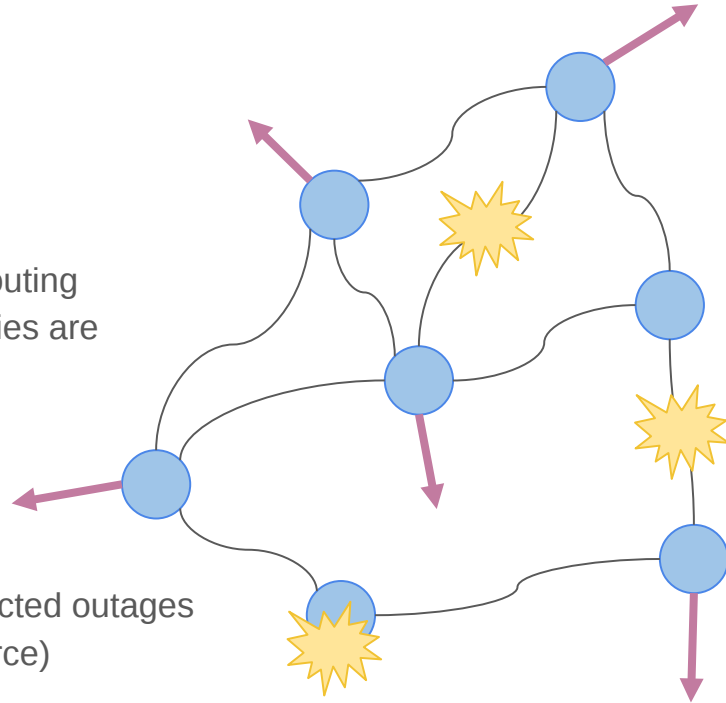
General assumptions:

- Nodes may move randomly within the topology
- Links between nodes frequently break
- Network service is maintained via **reactive** rerouting
- Links are considered ephemeral, and adjacencies are **proactively** discovered

Protocols are tuned for this, e.g.: OLSR, AODV

Key issues when applied to TVR use-cases:

- Reactive rerouting results in loss even for expected outages
- Proactive discovery unnecessarily wastes (scarce) resources



Delay Tolerant Networking

General assumptions:

- DTN is a delivery protocol designed to deliver traffic across between nodes without a simultaneously connected end-to-end path.
- This allows it to handle disruption and delay by storing data when adjacencies fail and forwarding when adjacencies form

But routing DTN bundles between nodes based on predicted contact times is a studied problem, see SABR - “Schedule-Aware Bundle Routing” (CCSDS):

<https://public.ccsds.org/Lists/CCSDS%207343R1/734x3r1.pdf>, and there may be transferable techniques.

Key issues when applied to TVR use-cases:

- DTN is not a routing protocol
- DTN operates a level above IP – forwards bundles

Potential Work Items

- TVR Use Cases (informational)
- TVR Approach/Framework
 - Including network services to be support by TVR
 - Information Models
 - Network resource (link) related?
 - Network service related?
- Coordination with other WGs on needed extensions

Out of Scope/For discussion

I believe that initially Time-Variance is a routing problem.

The following subjects should therefore be out of scope:

- Store-and-forward transport - See DTN
- Transport protocol adaptations - Transport Area?
- Outage planning/schedule creation, e.g. AI/ML
- Multicast?
- Multi-path?

That's not to say these aren't really interesting subjects, but I strongly suggest we focus on the basics first.

Questions, Opinions,
and Criticism?