Semantic Addressing in Multi-Organisation Delay Tolerant Networks

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To route, you need an address, however vague ...
How does my letter get to Santa?

FIB (with default egress)  →  FIB (with multiple egress)  →  Destination
What is routing?

- The process of moving a packet of data from source to destination (Webopedia)
- Routing is the process of selecting best paths in the network (Wikipedia)
- Routing is the scheduling of [an] itinerary (dictionary.com)
Unsure of how to reach the destination?

• Don’t know exactly which next hop?
• Don’t know when the next hop will be reachable?
• Does the destination move in space over time?
• Does the connectivity change over time?
• Are there multiple cooperating organisations operating in the same geographic area?
So what about when the destination keeps moving, in space or connectivity?

• Single organisation, large number of endpoints?
• Build a schedule of predicted waypoints and connectivity?
• Exhaustively calculate, or calculate on demand, or a mixture?
• Centralised or distributed calculation?
• How do you (can you?) summarise what is reachable through which next hop?
And what about multiple organisations operating in the same space?

• Multiple organisations, agreeing to collaborate on routing, in same geographic space?
• Each organisation calculates own locations and connectivity?
• External and internal destination exchanges (similar to BGP and OSPF routing table exchanges)?
Back to the problem ...

- Bus operators Red, White and Blue each run busses on separate routes around a city
- Each bus is given a URI dtn://<id>.bus.{red,white,blue}*
- Given:
  - Each route has a timetable.
  - Busses are allocated to routes according to serviceability.
  - Drivers are allocated to busses according to shift rosters.
  - Waypoints are formed when busses pass each other.
- Possible to model when and where waypoints are formed
- At every point in time, a static routing plan is defined

*example only, DTN URI structure is not defined yet
What’s in the FIB?

• As the waypoint is approached, the routing function can populate the FIB from the RIB
• So, at the point in time when a waypoint is formed, what does the FIB on each side look like?
  – Does it contain the entire set of busses for that day? Is it possible to summarise this?
• Does the FIB contain sufficient information to make a decision to keep, forward or discard the bundle?