An Efficient Bundle Protocol to handle Mobility & Intermittent Connectivity in DTN

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The Bundle Protocol (BP)

Mobility causes disruptions in a Mobile Wireless Network. The Intermittent Connectivity due to Mobility or explicit user choice can significantly decrease the performance and even cause connections to fail altogether when communicating with standard ***Internet Protocol***. To maintain the connectivity, a DTN (Delay & Disruption Tolerant Network) node can store-and-forward the Bundle (aggregated messages) to the next DTN node through Custody Transfer reliability mechanism. Thus the ***Bundle Protocol*** provides guaranteed delivery of data with no loss and also experience low handover latency.

System Model for Mobile Internetworking

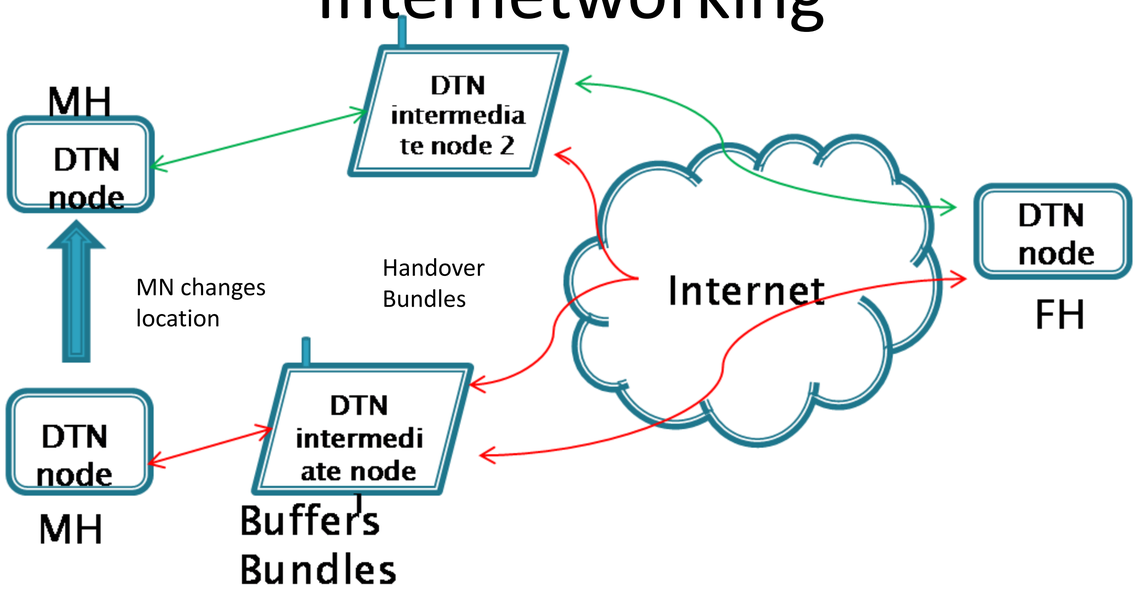

Fig.1 Bundle transfer after Handover of a Mobile Host (MH)

Protocol Operation

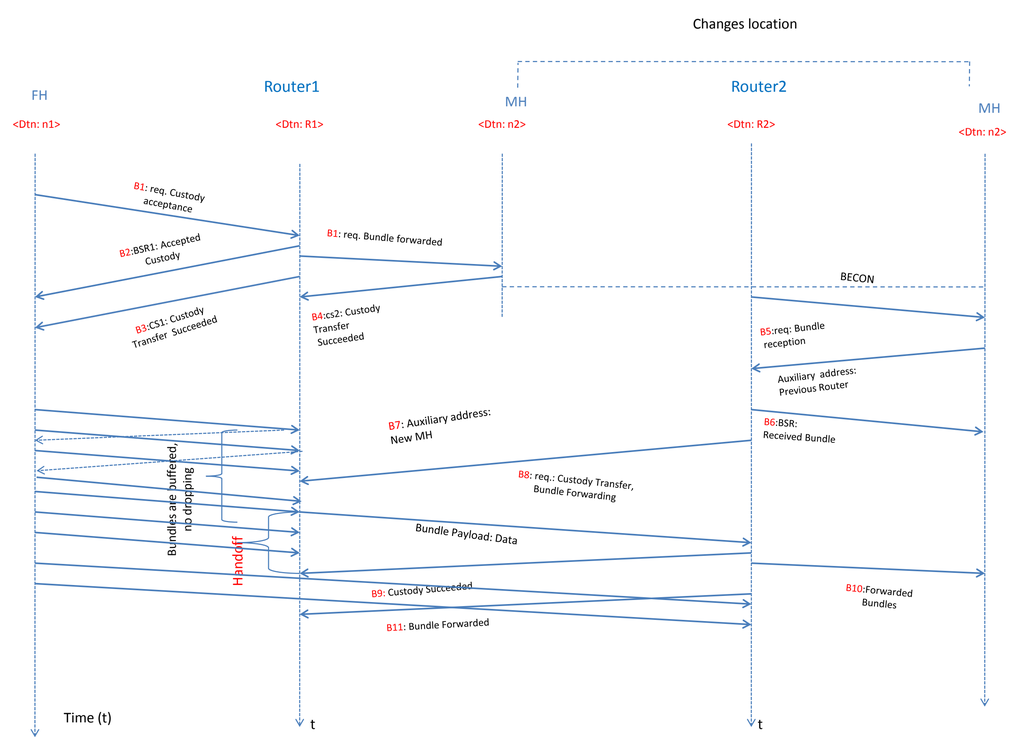

Fig.2 Protocol sequences when a Mobile Host (MH) switches from one Router to another

- Direction: Fixed Host (FH) to Mobile Host (MH)
- Initiative: Fixed party

The proposed protocol stack

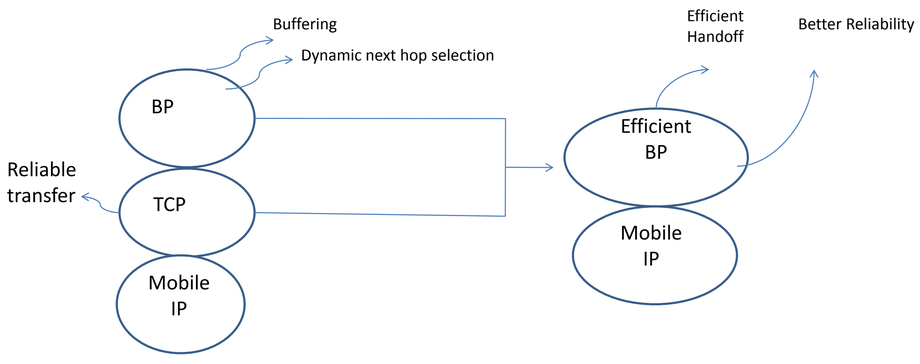

Fig. 3 The Bundle Protocol Stack

An Bundle Protocol can provide reliable transfer of Bundles and thus maintains the connectivity at the Transport layer in Handover situations

Handover Sequences between DTN routers

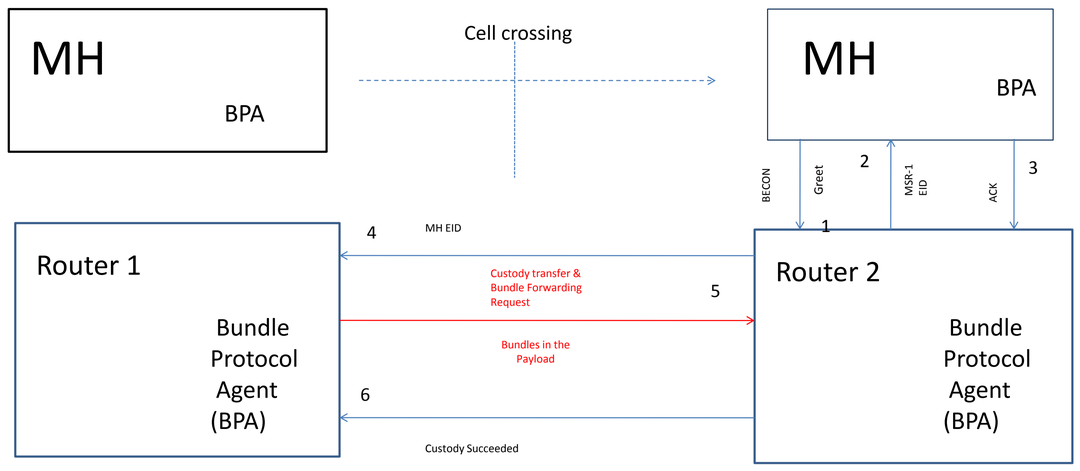

Fig.4 Handing over data (Bundle) from one DTN router to another involves less number of control exchanges

Bundle Protocol extension

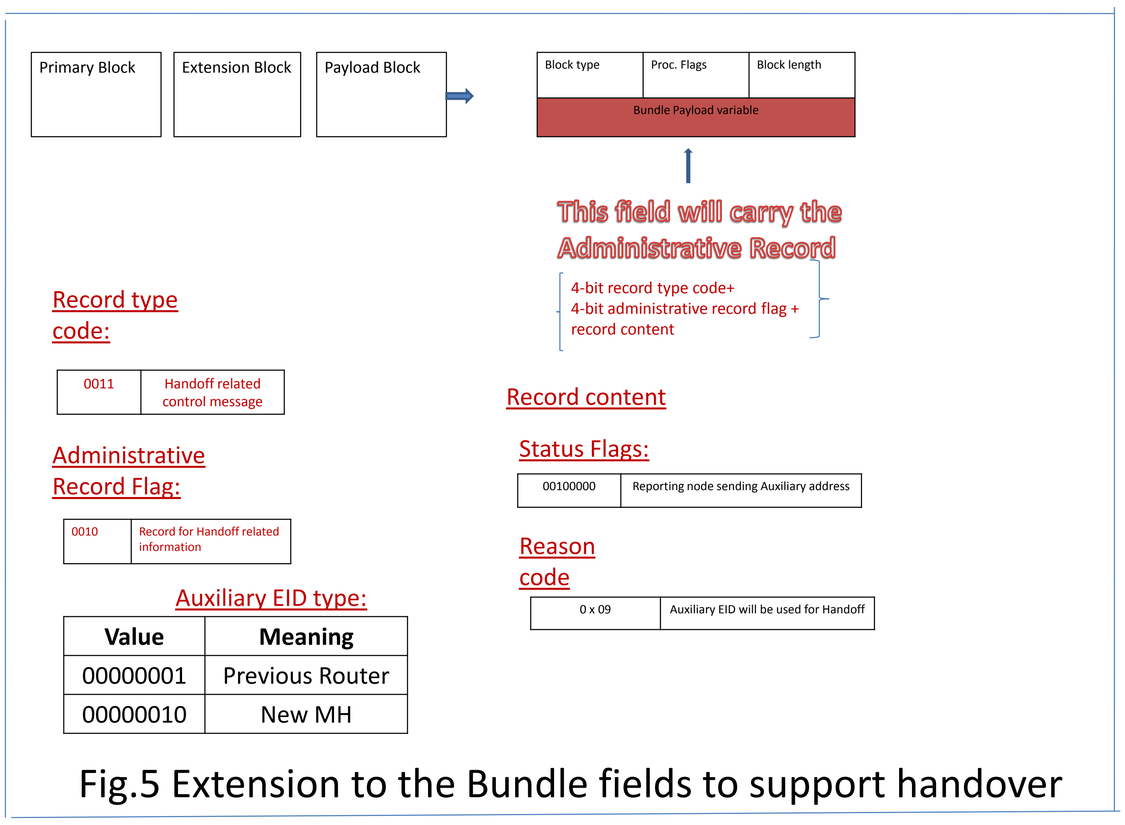

Fig.5 Extension to the Bundle fields to support handover

Handoff latency & related packet losses

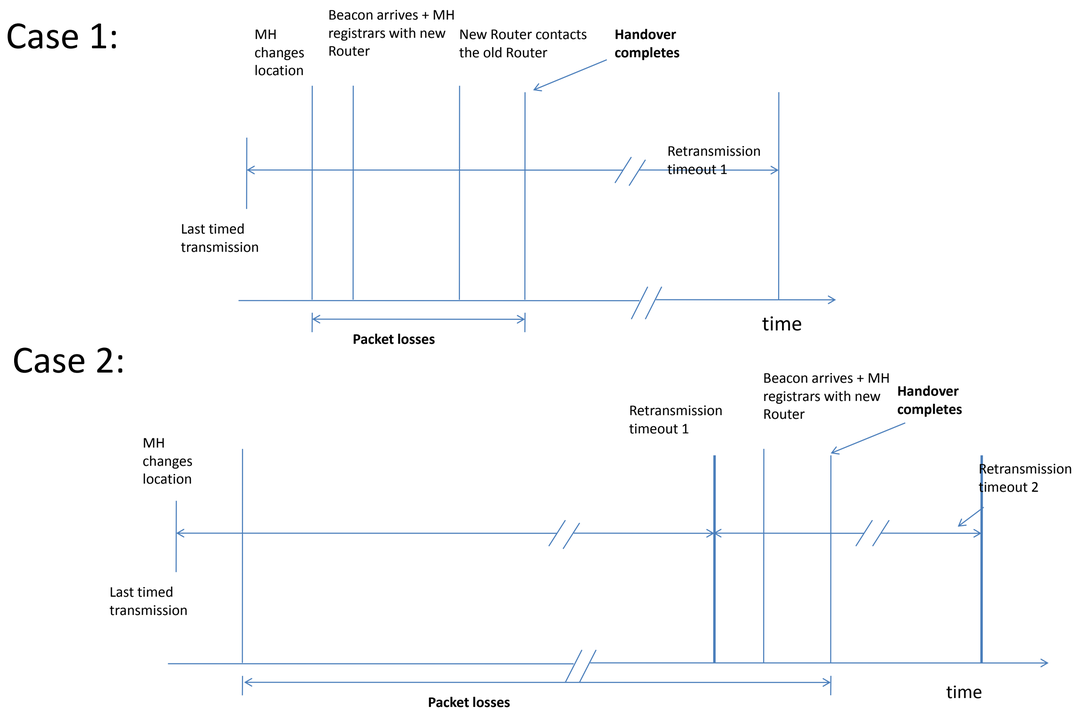

Fig.5 MH starts looking for BECON from the New Router with 0 sec & 1 sec delay respectively after it arrives in the new cell

Application Scenarios

Application Types	Mode of Communication	Connectivity required
IP Telephony	Continuous communication	Requires Persistent connectivity for the lifetime
Media Streaming can complete individual transactions in consecutive Connectivity periods	Continuous communication	Requires Persistent connectivity for the lifetime
E-mail	Transaction-based (request-response-style)	Can complete individual transactions in consecutive Connectivity periods
Data synchronization	Transaction-based (request-response-style)	Can complete individual transactions in consecutive Connectivity periods
File sharing tools	Transaction-based (request-response-style)	Can complete individual transactions in consecutive Connectivity periods