IETF transport protocols and congestion control mechanisms

Service taxonomy discussion

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set of transport service features

transport service
over a transport protocol
with relevant transport functions

Transport Protocol Components (mechanisms)

Mechanism	UDP	UDP-L	DCCP	SCTP	TCP
Unicast	Yes	Yes	Yes	Yes	Yes
Mcast/IPv4Bcast	Yes(2)	Yes	No	No	No
Port Mux	Yes	Yes	Yes	Yes	Yes
Mode	Dgram	Dgram	Dgram	Dgram	Stream
Connected	No	No	Yes	Yes	Yes
Data bundling	No	No	No	Yes	Yes
Feature Nego	No	No	Yes	Yes	Yes
Options	No	No	Support	Support	Support
Data priority	*	*	*	Yes	No
Data bundling	No	No	No	Yes	Yes
Reliability	None	None	None	Select	Full
Ordered deliv	No	No	No	Stream	Yes
Corruption Tol.	No	Support	Support	No	No
Flow Control	No	No	Support	Yes	Yes
PMTU/PLPMTU	(1)	(1)	Yes	Yes	Yes
Cong Control	(1)	(1)	Yes	Yes	Yes
ECN Support	(1)	(1)	Yes	TBD	Yes
NAT support	Limited	Limited	Support	TBD	Support
Security	DTLS	DTLS	DTLS	DTLS	TLS, AO
UDP encaps	N/A	None	Yes	Yes	None
RTP support	Support	Support	Support	?	Support

Protocol Components that offer API services

Mechanism	UDP	UDP-L	DCCP	SCTP	TCP	
Unicast	Yes	Yes	Yes	Yes	Yes	
Mcast/IPv4Bcast	Yes(2)	Yes	No	No	No	
Port Mux	Yes	Yes	Yes	Yes	Yes	??
Mode	Dgram	Dgram	Dgram	Dgram	Stream	
Connected	No	No	Yes	Yes	Yes	??
Data bundling	No	No	No	Yes	Yes	
~~Feature Nego~~	~~No~~	~~No~~	~~Yes~~	~~Yes~~	~~Yes~~	
~~Options~~	~~No~~	~~No~~	~~Support~~	~~Support~~	~~Support~~	
Data priority	*	*	*	Yes	No	
Data bundling	No	No	No	Yes	Yes	
Reliability	None	None	None	Select	Full	
Ordered deliv	No	No	No	Stream	Yes	
Corruption Tol.	No	Support	Support	No	No	
Flow Control	No	No	Support	Yes	Yes	
PMTU/PLPMTU	(1)	(1)	Yes	Yes	Yes	??
Cong Control	(1)	(1)	Yes	Yes	Yes	
~~ECN Support~~	~~(1)~~	~~(1)~~	~~Yes~~	~~TBD~~	~~Yes~~	
NAT support	Limited	Limited	Support	TBD	Support	??
Security	DTLS	DTLS	DTLS	DTLS	TLS, AO	
~~UDP encaps~~	~~N/A~~	~~None~~	~~Yes~~	~~Yes~~	~~None~~	
~~RTP support~~	~~Support~~	~~Support~~	~~Support~~	~~?~~	~~Support~~	

Suggested list of Transport Service Components

(1) "connectivity" {UDP;TCP;HTTP; … seen by middleboxes}
(2) "Security" {None; Custom; DTLS' TLS…}
(3) Delivery Style
{Ordered stream; Message-Oriented-Delivery; Unordered Message Delivery}
(4) Congestion control {type}
(5) Transport-Layer Multipath
{None; using multiple paths simultaneously; fallback)
(6) Transport-Layer Mobility
{None; communication session spans change of location/address}
(7) Multiplexing (multiple app-layer sessions within single session seen by middleboxes)
(8) Prioritization (delivering higher priority data first)
(9) Corruption tolerance {None; detection; correction e.g., FEC}
(10) Point-to-multipoint delivery
{replicated unicast; multicast; broadcast; anycast}

Is it useful to structure the list?

- Data Reliability (ensuring good throughput)
  - | - Loss Detection/Notification
  - | - Loss Recovery
  - | - Loss Protection

- Congestion Control
  - | - Congestion Feedback
  - | - Rate Regulation
  - | - Receiver Controls

- Security

- Group membership
  - | - Membership Notification
  - | - Membership Management

- Session Management
  - | - Group Membership Tracking
  - | - Session Advertisement
  - | - Session Start/Stop
  - | - Session Configuration/Monitoring

- Tree Configuration

RFC 3048 RMT Building Blocks

Possible next steps

List protocol components

Agree a list of service components (are there more/different items)

Map service components to protocols