

# PCEP over QUIC

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Feng Yang - China Mobile (yangfeng@chinamobile.com)

Changwang Lin -New H3C Technologies  
( linchangwang.04414@h3c.com)

Tingting Han-China Mobile (hantingting@chinamobile.com)-  
Presenter

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# Motivation

- Currently, PCEP has the following challenges:
  - PCEP session establishing delay is prolonged: Before a session is successfully established, PCC and PCE need to perform a three-way handshake. If security authentication is required, TLS also needs to be deployed, which is a handshake for authentication as well.
  - Head of line block: When PCC requests path computation information for multiple address families, any packet is blocked, the sending of path request for all address families is affected

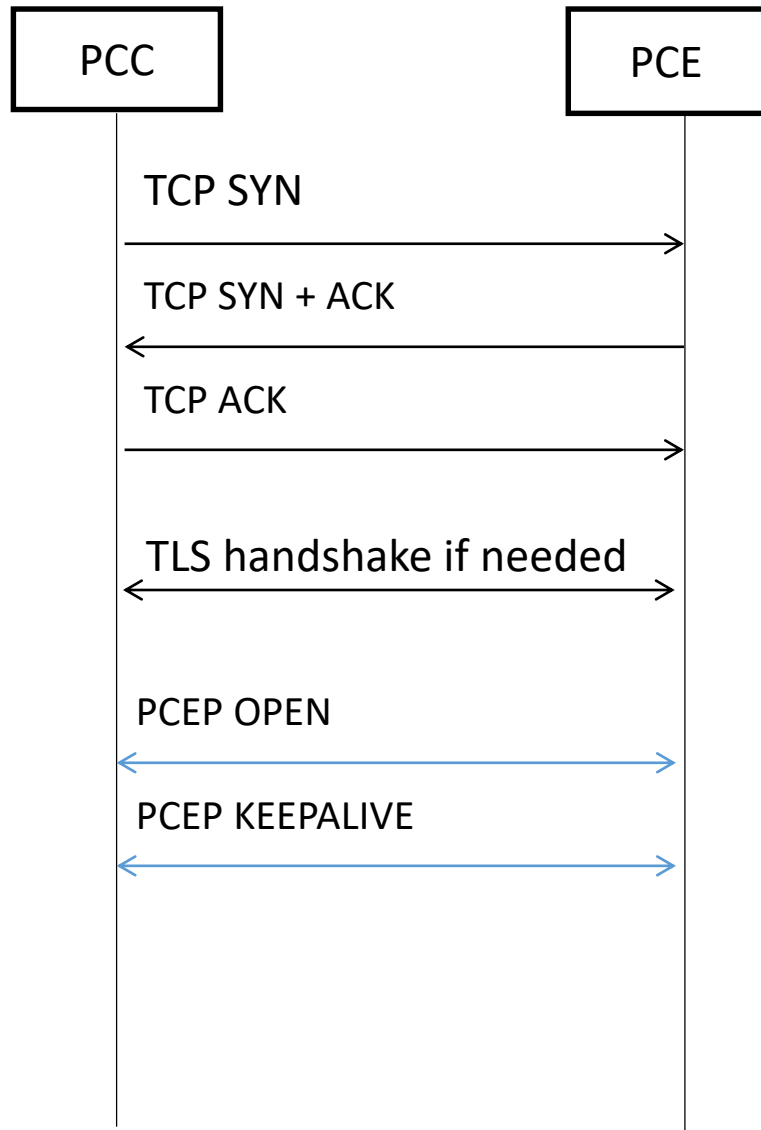
# What can QUIC bring to PCEP

- **Reduced Latency:** QUIC's faster handshake reduces the time needed to establish connections, enhancing the speed of path computation requests.
- **Improved Security:** QUIC integrates TLS, providing improved security and privacy for PCEP transmissions.
- **Connection Migration:** QUIC allows for seamless connection migration between networks, offering increased mobility and reliability.
- **Stream Multiplexing:** Supports concurrent transmission of multiple streams without interference, improving performance in complex network scenarios.

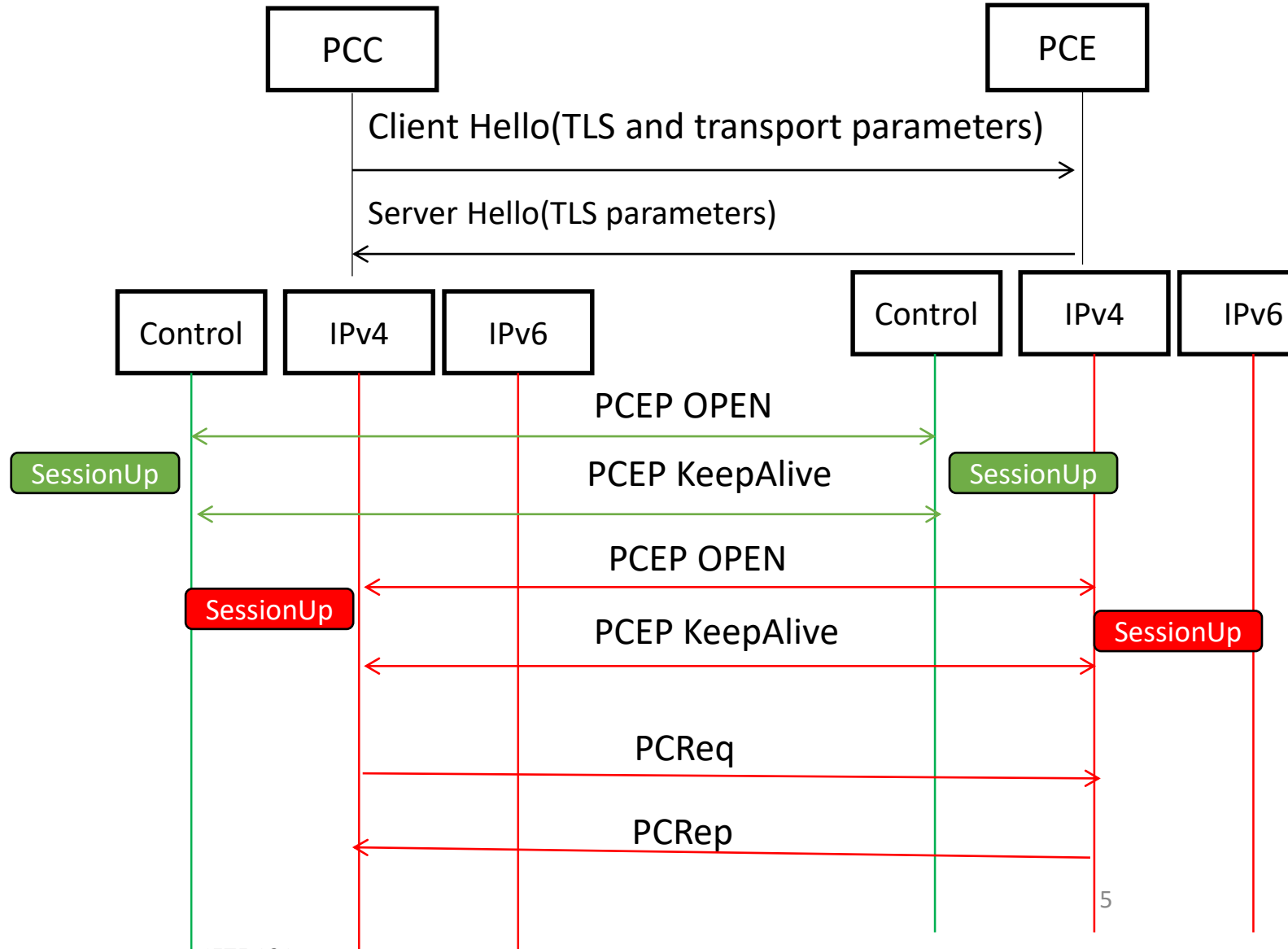
# Terminologies

- **PCEPoQ:**Running th PCEP protocol over multiple QUIC streams.
- **QUIC connection:** A transport-layer connection between two endpoints using QUIC [RFC9000].
- **QUIC streams:** A bidirectional or unidirectional byte stream provided by the QUIC transport [RFC9000].
- **PCEP channel:** Instance of PCEP protocol state machine mapped to specific QUIC stream.
- **PCEP control channel:** a channel dedicated to transmitting the session control data, which is implemented as a bidirectional stream.
- **PCEP data channel:** for ipv4/ipv6 address family channel, which is implemented asymmetrically as bidirectional streams.

# The connection for PCEP over QUIC versus PCEP over TCP



PCEP over TCP



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PCEP over QUIC

# PCEP over QUIC FSM

Event/State/Action	Idle	Pending	OpenWait	KeepWait	SessionUP
New PCC/PCE	Init QUIC Connection; ->Pending				
QUIC Connect Success		Send Open; ->OpenWait			
Receive Open			Send Keepalive ->KeepWait		
Receive KeepAlive				->SessionUp	
Error	-	->Idle	->Idle	->Idle	->Idle

## The main differences between the PCEPoQ and PCEP state machines :

- **Connection Maintenance:** PCEP requires maintaining a TCP connection and responding to changes in its state. In contrast, PCEPoQ maintains a QUIC connection, which doesn't require responding to state changes after it's established.
- **Session Correspondence:** PCEP has each session corresponding to a separate TCP connection. PCEPoQ, however, maintains a single QUIC connection for all sessions, with a shared control channel and individual data channels for each session.
- **State Machine Handling:** In the PCEPoQ state machine, the creation and closure of control and data channels need to be handled when there are state changes.

# PCEP Packets

	Control Channel	Function Channel
OPEN	Control	Data
KEEPALIVE	Control	Data
NOTIFICATION	Control	Data
PCErr	Control	Data
PCReq	/	Data
PCRep	/	Data
Close	Control	Data

PCReq and PCRep messages are sent in the Data Channel. Other messages are sent in either the Control Channel or Data Channel, affecting the state of their respective channels..

## Next Steps

- Any questions or comments are Welcomed
- Seeking for feedback



THANKS