One-way Delay Measurement Based on Reference Delay

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• End-to-end one-way delay (OWD) measurement: E2E OWD is an important performance indicator for SLA guarantee.

• An example: HD video surveillance service scenario in 5G network. The end-to-end one-way delay is the sum of T1+T2+T3+T4.

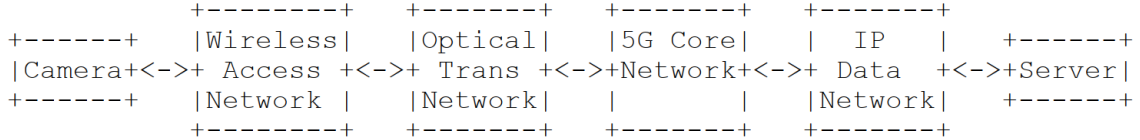

Figure 1:A Scenario for End-to-end One-way Delay

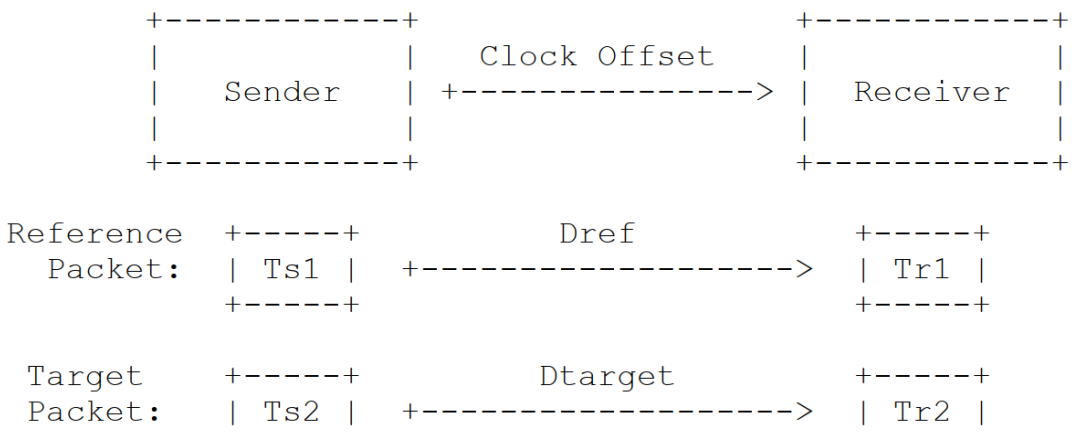

Figure 2:Topology of One-way Delay Measurement

•Sender to Receiver Network: End-to-end one-way delay from the sender to the receiver is measured. Intermediate devices other than the sender and receiver are hidden for simplicity.

•Reference Packet: The E2E one-way delay for reference pkt is stable and bounded, denoted as Dref.

•Target Packet: The E2E one-way delay for target pkt is the measurement target, denoted as Dtarget.

•Timestamping: We timestamp reference and target pkt on the sender and receiver side respectively, denoted as Ts1, Ts2, Tr1 and Tr2.

•For reference packet and target packet, we can get Equation 1 and Equation 2, respectively.

$$Tr1 - Ts1 = Dref + Offset1 \quad (1)$$

$$Tr2 - Ts2 = Dtarget + Offset2 \quad (2)$$

•When sending time interval between reference and target pkt is small, Offset1 = Offset2.

•(Equation 2 – Equation 1), we get Equation 3. Now we can calculate Dtarget.

$$Dtarget = (Tr2 + Ts1) - (Tr1 + Ts2) + Dref \quad (3)$$