New CoAP Block-Wise Transfer Options
draft-bosh-core-new-block

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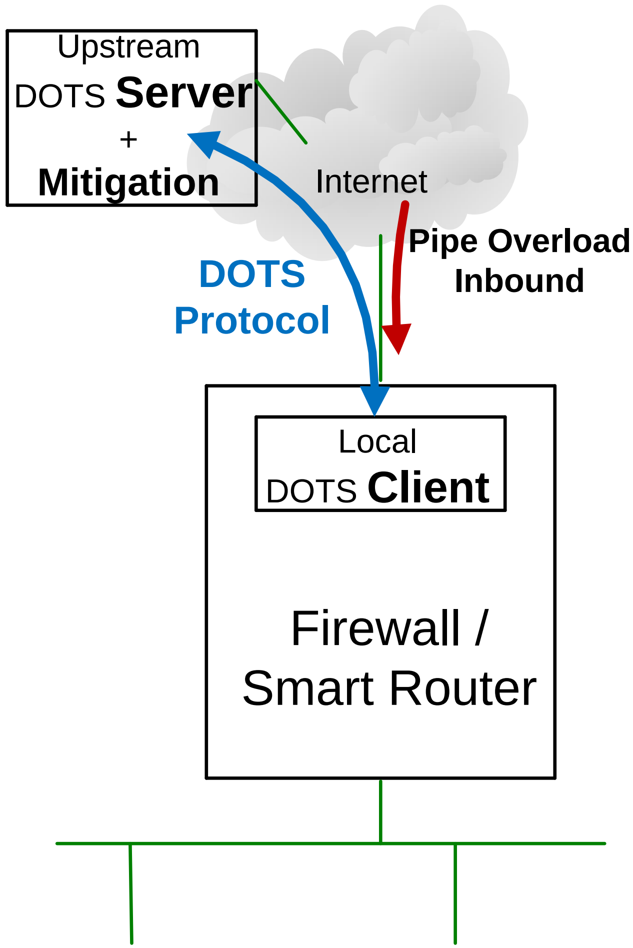
DOTS Use Case Example Environment



- DDoS Open Threat Signalling (DOTS)
- DOTS: App – CBOR – CoAP – DTLS – IP
- Client requests mitigation (NON)
- Server updates with simple DOTS mitigation status (NON)
- Inbound Pipe Overload
  - Clients Can still request mitigations
  - Mitigation should be able to control pipe overload

DOTS General Operation

- Configuration
  - Confirmable
  - Peace Time
- Mitigation Requests / Responses
  - Non Confirmable
  - Single Packets contain all the information
  - Works with response packet loss
    - E.g. Request Mitigate traffic to IP W.X.Y.Z/32
    - Status updates may get lost
- Application Heartbeats
  - Non Confirmable
  - Initiated separately by Client and Server
  - Server can detect Client alive at all times
  - Client continues, even if no Server traffic seen

DOTS Telemetry

- DDoS Telemetry information both ways
  - (Smart) Client -> Server (PUT)
  - Server -> Client (GET)
- Data likely larger than Single Packet
- Without Packet Loss
  - BLOCK1 and BLOCK2 fine (Non Confirmable)
- With Packet Loss (usually Server -> Client)
  - Next BLOCK1 response lost
  - Next BLOCK2 packet request lost
  - All stalls – even when using Non Confirmable

Oversized Packet Handling

- Use IP Fragmentation
  - Requires large receipt buffers
  - Unable to recover missing fragments
- Application break up data into Chunks
  - YANG <anydata> requires chunk to be full JSON as per RFC7951
  - How to break data down to minimize no of chunks
- Use BLOCK1 and BLOCK2： Has limitations
  - Performance (symmetric traffic requires ‘ACK’ before next block is sent)
  - Handling lossy environments

CoAP Options BLOCK3 and BLOCK4

- Same as BLOCK1 and BLOCK2 with additions
- All Blocks sent before 'ACK' required
  - Similar to using fragmented IP packets
  - NSTART needs to be increased if CONfirmable
- Missing Blocks can be re-requested
- Each set of Blocks have same Block ID (BID) for re-assembly
  - Could use ETag for BID, but RFC7252 says:
    "*An entity-tag is intended for use as a* ***resource-local identifier*** *for differentiating between representations of the same resource*"

BLOCK1 vs. BLOCK3

- BLOCK1
  - If NON and no response, limited to PROBING_RATE (1 Byte/sec)
- BLOCK3
  - “Body” of data subject to PROBING_RATE
    - Higher transmit rate for “body” with multiple blocks as all sent with no waiting
- Both can utilize 4.08 for missing blocks
- 4.08 needs to be extended to include array of missing blocks in response (using repeat option with BLOCK3?)

BLOCK2 vs. BLOCK4

- BLOCK2
  - Server has to wait for next block request
  - Copy of “body” maintained for EXCHANGE_LIFETIME
- BLOCK4
  - Entire set of Blocks for “body” can be sent without waiting
  - Higher performance (negligible waits between blocks arriving at Client)
  - A Client can indicate multiple blocks are missing
  - Server can ‘delete’ “body” on successful receipt
  - Caches can keep data at Block and / or “body” level

BLOCK3 & BLOCK4 Tokens

- How should Tokens be handled
  - Set of Block4 responses (same BID) – tokens all the same?
  - Affect on Proxies
- RFC7252 5.4.1:
  "The Token is used to match a response with a request."
  "A token is intended for use as a client-local identifier"
- RFC7641 4.2:
  "Each such notification response (including the initial response) MUST echo the token specified by the client in the GET request."
- RFC7959 3.4:
  "requests for additional blocks cannot make use of the token of the Observation relationship"

Next Steps

- RFC 8613 OSCORE implications
- Further discussion

Thank You

Appendix

Example of Mitigation Status with Telemetry


```
{
    "ietf-dots-signal-channel:mitigation-scope": {
      "scope": [
        {
          "mid": 12332,
          "mitigation-start": "1507818434",
          "alias-name": [
            "https1",
            "https2"
          ],
          "lifetime": 1600,
          "status": "attack-successfully-mitigated",
          "bytes-dropped": "134334555",
          "bps-dropped": "43344",
          "pkts-dropped": "333334444",
          "pps-dropped": "432432",
          "ietf-dots-telemetry:total-attack-traffic": [
            {
              "ietf-dots-telemetry:unit": "megabit-ps",
              "ietf-dots-telemetry:mid-percentile-g": "900"
            }
          ],
          "ietf-dots-telemetry::attack-detail": [
            {
              "ietf-dots-telemetry:vendor-id": 1234,
              "ietf-dots-telemetry:attack-id": 77,
              "ietf-dots-telemetry:source-count": {
                "ietf-dots-telemetry:peak-g": "10000"
              }
            }
          ]
        }
      ]
    }
  }
```

Example of DOTS Telemetry


```
{
    "ietf-dots-telemetry:telemetry": {
      "pre-or-ongoing-mitigation": [
        {
          "tmid": 123,
          "target": {
            "target-prefix": [
              "2001:db8::1/128"
            ]
          },
          "target-protocol": [
            17
          ],
          "total-attack-traffic": [
            {
              "unit": "megabit-ps",
              "mid-percentile-g": "900"
            }
          ],
          "attack-detail": [
            {
              "vendor-id": 1234,
              "attack-id": 77,
              "start-time": "1957818434",
              "attack-severity": "high"
            }
          ]
        }
      ]
    }
  }
```