ECN and DSCP support for HTTPS's Connect-UDP

draft-westerlund-masque-connect-udp-ecn-dscp-02

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Updates since last meeting

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- Discussion on extensibility at last meeting without clear conclusion
- Request to simplify

- New approach
  - Redesigned to one extension that has zero per-packet overhead and combines ECN and DSCP
  - Note discussion about combining extension in doc
    - Removes dependency on this specific extension however it’s still needed to combine it other extension

Two Extensions

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ECN-zero-byte Extension

- ECN codepoints bound to Context IDs
- Example:
  - Context=0: (Not-ECT) UDP Payload
  - Context=2: ECT(0) + CID=0
  - Context=4: ECT(1) + CID=0
  - Context=6: CE + CID=0

```
UDP Proxying HTTP Datagram Payload {
  Context ID (i),
  UDP Proxying Payload (..)
}
```

ECN plus DSCP Extension

- Encodes DSCP + ECN in one byte prefixed before UDP Proxying Payload
- Example:
  - CID=0: UDP Payload
  - CID=2: DSCP+ECN followed by CID=0

```
ECN/DSCP UDP Proxying Payload {
  DSCP(6),
  ECN(2),
  UDP Proxying Payload (..) # Payload per another Context ID
}
```

Zero-bytes, combined ECN and DSCP extension

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- Use Context IDs to signal always both the ECN and DSCP values
- HTTP header to negotiate extension and announce initial set(s) of Context IDs
- Assign and ack capsules to provides additional Context IDs for new DSCP values

ECN/DSCP Context ID Assignment Format

```
ECN_DSCP_CONTEXT_ASSIGNMENT {
      DSCP_VALUE (6),
      NOT_ECN_CONTEXT (i)
      ECT_1_CONTEXT (i),
      ECT_0_CONTEXT (i),
      CE_CONTEXT (i),
    }
```

Context ID Value	ECN bit	ECN Value	DSCP Value
0	0b00	Not-ECT	0
2	0b01	ECT(1)	0
4	0b10	ECT(0)	0
6	0b11	CE	0

- Always assign all four ECN values as all markings may be observed in the network, e.g. due to (erroneous) rewriting
- Do we need an DSCP-only option (meaning only one Conext ID for DSCP and Not-ECT)?

Negotiation and initial announcement

- `ECN-DSCP-Context-ID` Structured Header Field used in HTTP request and response
- Example: `ECN-DSCP-Context-ID =(48,8,10,12,14), (0,0,2,4,6,)`

Capsules for dynamic updates

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```
ECN_DSCP_CONTEXT_ASSIGN Capsule {
     Type (i) = TBA_1
     Length (i),
     ECN_DSCP_CONTEXT_ASSIGNMENT (..) ...,
   }

ECN_DSCP_CONTEXT_ACK Capsule {
     Type (i) = TBA_2
     Length (i),
     ECN_DSCP_CONTEXT_ASSIGNMENT (..) ...,
   }
```

- More discussion needed about what to do when you don't receive an ACK
  - Do we want this interaction pattern?

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