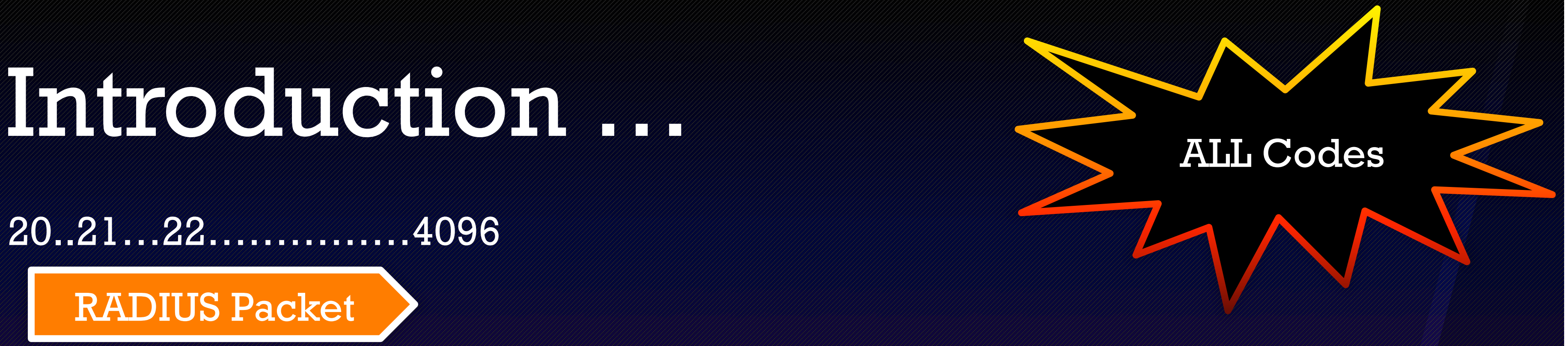
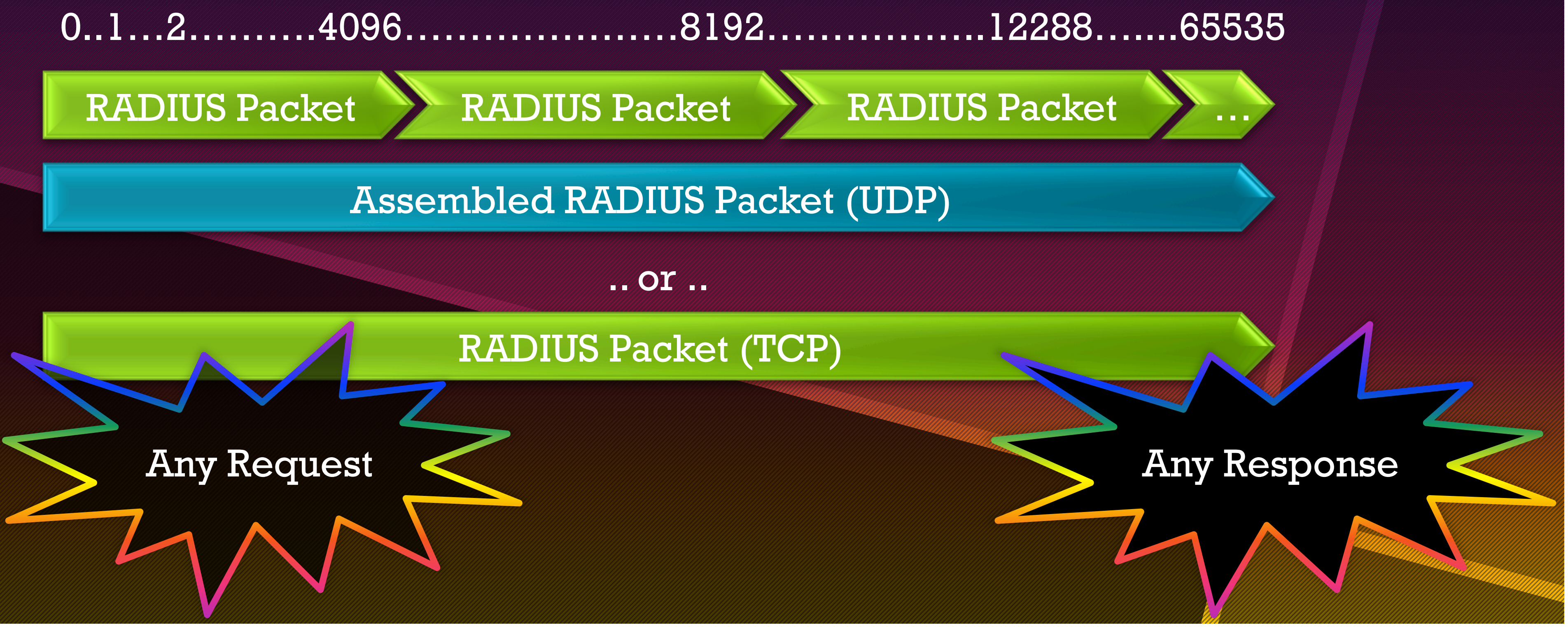
RADIUS
Extended Request

draft-deacon-radext-extended-request-00

Introduction …



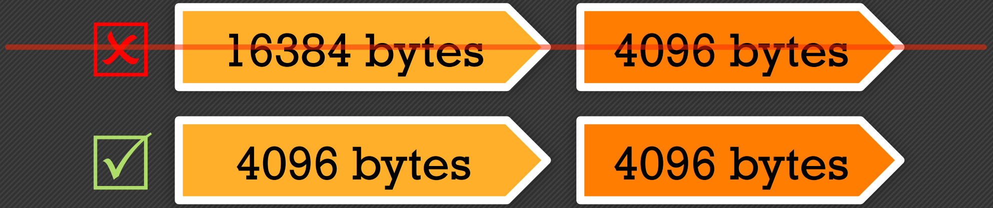
“The minimum length is 20 and maximum length is 4096.”
-- RFC 2865 sec 3.



Goals

Minimize Surprise

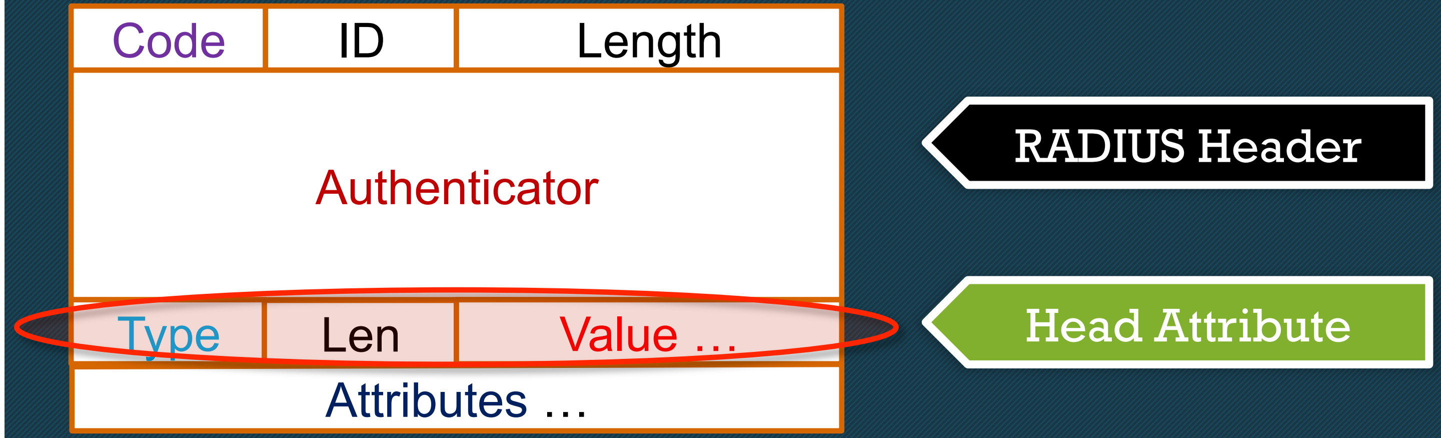
- Fragment-Data used only where necessary
- Clients transmit large requests only while supported by server
- Servers transmit large responses only while supported by client



Plug and Play

- Client and server automatically discover large packet support
- Clients automatically obtain administrative limits from servers
- Servers discover large response support of client and proxy path
- Signal server support for TCP and TCP large packet to clients

Extended-Request

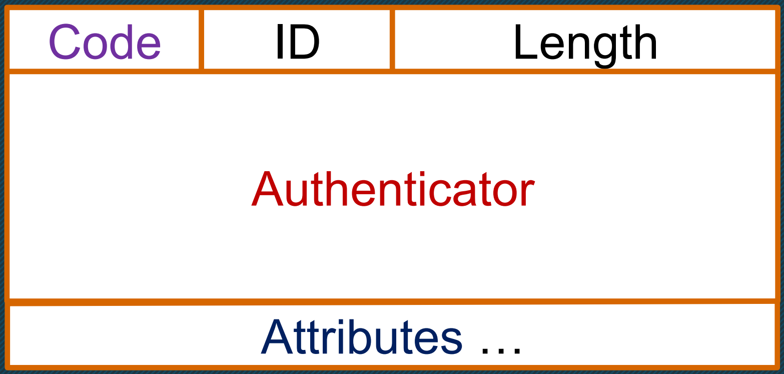


Section 3 "An Extended-Request packet is sent to the RADIUS server requesting an action whose purpose is determined by an attribute present immediately after RADIUS header within the RADIUS packet"

Head Attributes

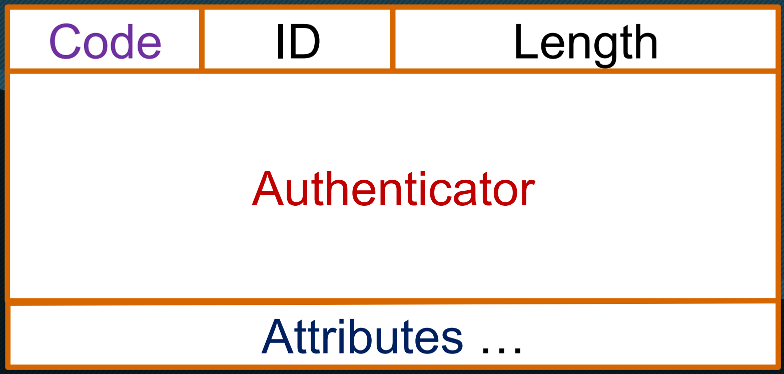
Fragment-Data	Facilitates fragmentation of RADIUS packets beyond 4096 bytes
Fragment-Inquire	Requests fragment related capabilities and parameters from RADIUS server

Extended-Response



Indicates success in response to Extended-Request. Response attributes may be included per Extended-Request head attribute specification.

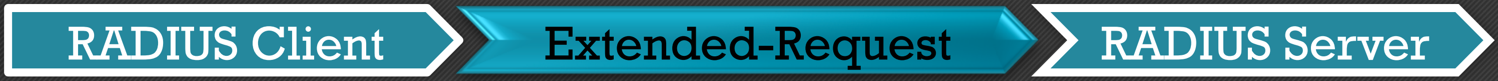
Extended-Reject



Communicates failure of Extended-Request. Error-Cause attribute may be included to provide feedback to client.

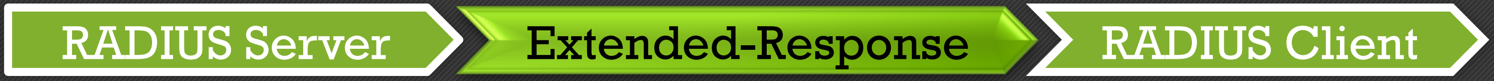
Fragment-Data

Command Code Summary



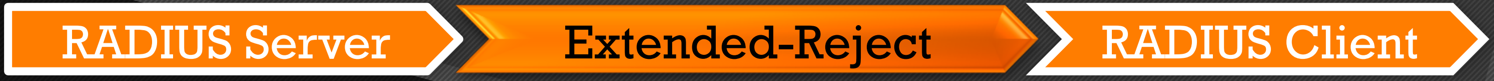
Extended-Request

- On RADIUS Request transmits (Inner) Request to Server.
- During RADIUS Reply used to request next Fragment from Server.



Extended-Response

- On RADIUS Request transmits Fragment Ack to Client.
- During RADIUS Reply transmits (Inner) Reply to Client.

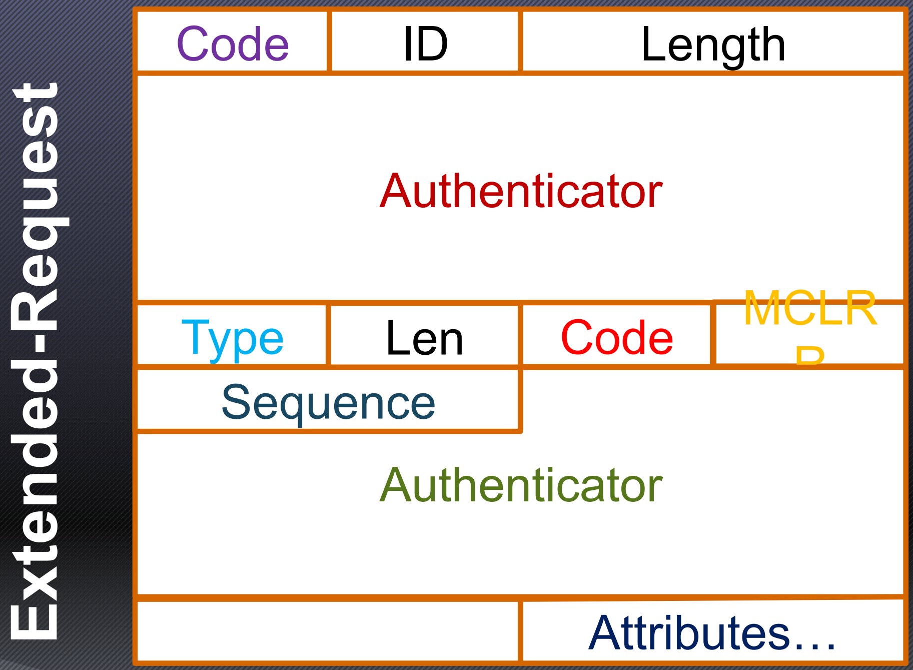


Extended-Reject

- On RADIUS Request transmits Fragment failure to Client.
- During RADIUS Reply Extended-Reject is unused.

Fragment-Data

RADIUS **REQUEST** within Fragment-Data



Code = Extended-Request
ID, Len, Authenticator = Same as **Accounting-Request**

Type = Fragment-Data
Code = Think 802.1Q Auth/Acct/CoA/Disc…etc.
Flags = More Data | Cont=0
Sequence = 1.2.3…65535

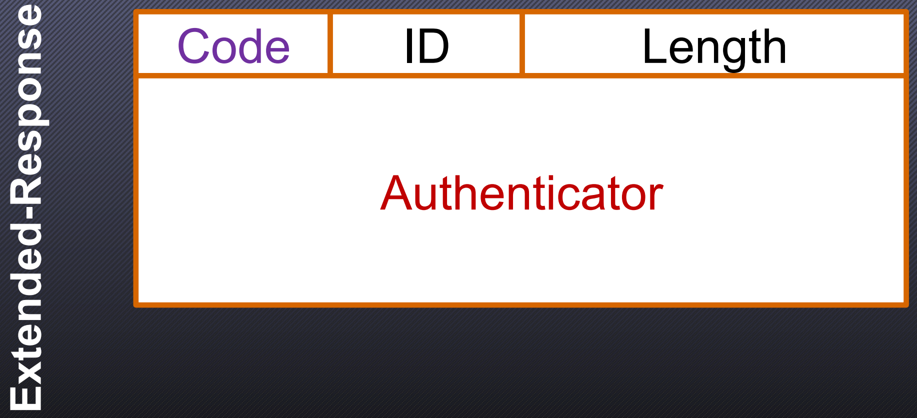
Authenticator = Code specific Authenticator, doubles as "State" for tracking Fragment-Data requests

Attributes = Code Specific Request Attributes

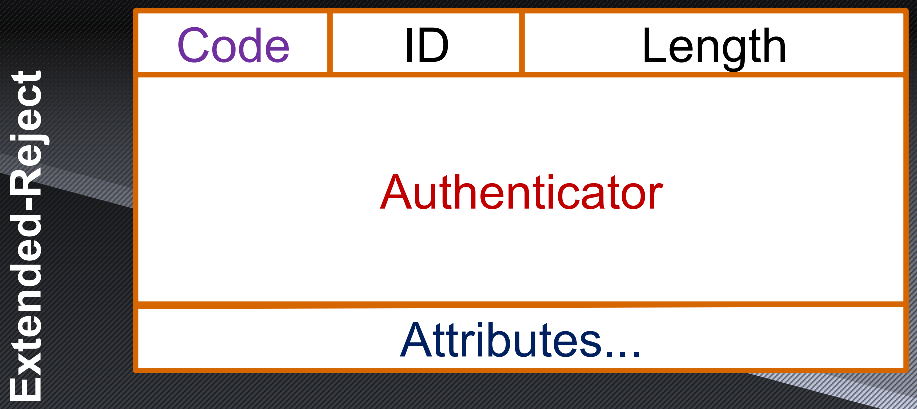
Consistent 24 bytes overhead per fragment …

Fragment-Data

RADIUS **REQUEST** Extended-Response, Extended-Reject



Code = Extended-Response
ID, Len, Authenticator = Same as **Accounting-Response**

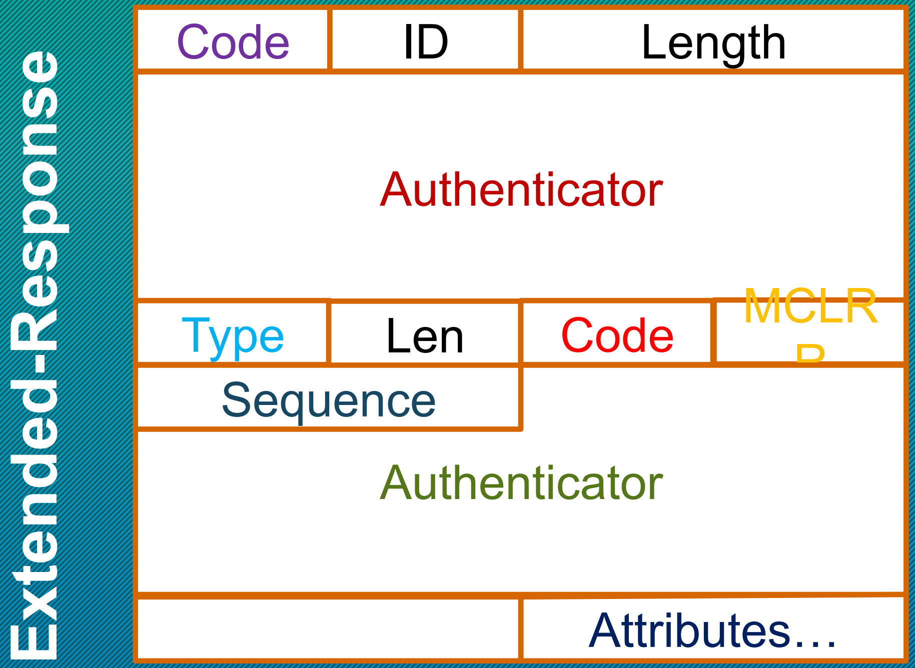


Code = Extended-Reject
ID, Len, Authenticator = Same as **Accounting-Response**
Attributes = Error-Cause

- **Missing Attribute**
- **Administratively Prohibited**
- **Unsupported Extension**
- **…**

Fragment-Data

RADIUS **REPLY** within Fragment-Data



Code = Extended-Response
ID, Len, Authenticator = Same as **Accounting-Response**

Type = Fragment-Data
Code = Think 802.1Q Auth/Acct/CoA/Disc...etc.
Flags = More Data | Cont=0
Sequence = 1.2.3…65535

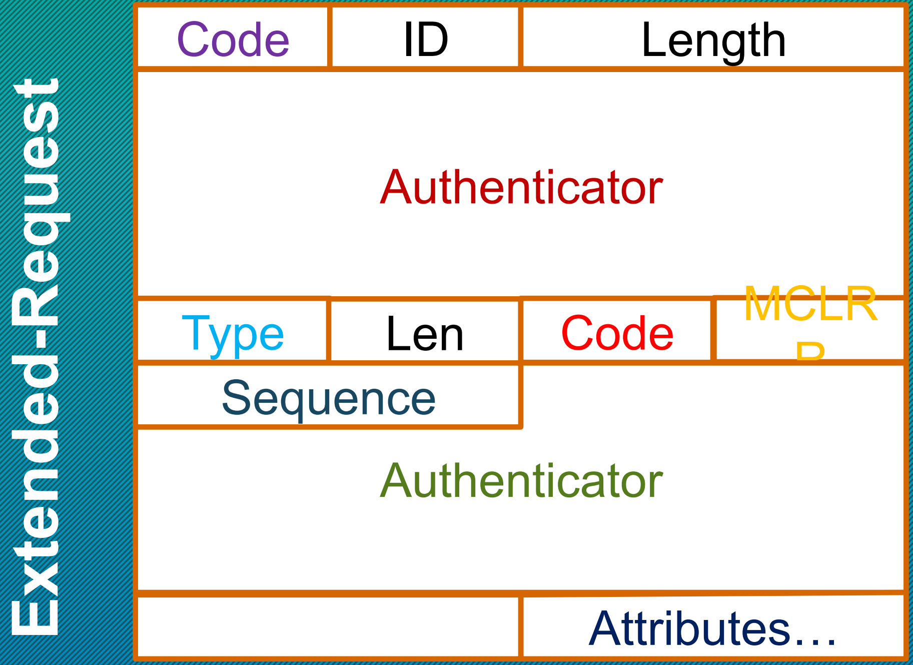
Authenticator = Code specific Reply Authenticator, doubles as "state" when issuing Extended-Request to retrieve next response

Attributes = Code Specific Reply Attributes

Consistent 24 bytes overhead per fragment …

Fragment-Data

RADIUS **REPLY** Extended-Request



Code = Extended-Request
ID, Len, Authenticator = Same as **Accounting-Request**

Type=Fragment-Data
Code, Flags (Cont=1),
Sequence, Authenticator = Echoed from last received Extended-Response

Sample Flow (Access Request)

Extended-Req C=0,M=1,Seq 1

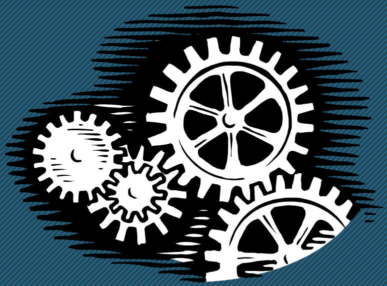
Extended-Response

Extended-Req C=0,M=1,Seq 2

Extended-Response

Extended-Req C=0,M=0, Seq 3

Fragments assembled internally as Access-Request then processed normally.



Final Extended-Req acknowledged by Extended-Response

Extended-Res C=0,M=1,Seq 1

Extended-Req C=1,M=1, Seq 1

Extended-Res C=0,M=0, Seq 2

Assembled fragment processed normally as Access-Accept or Access-Reject.

Retransmission Overview

1

RADIUS CLIENT drives retransmission.

Outer Extended Request/Response identical behavior to Accounting Request/Response.

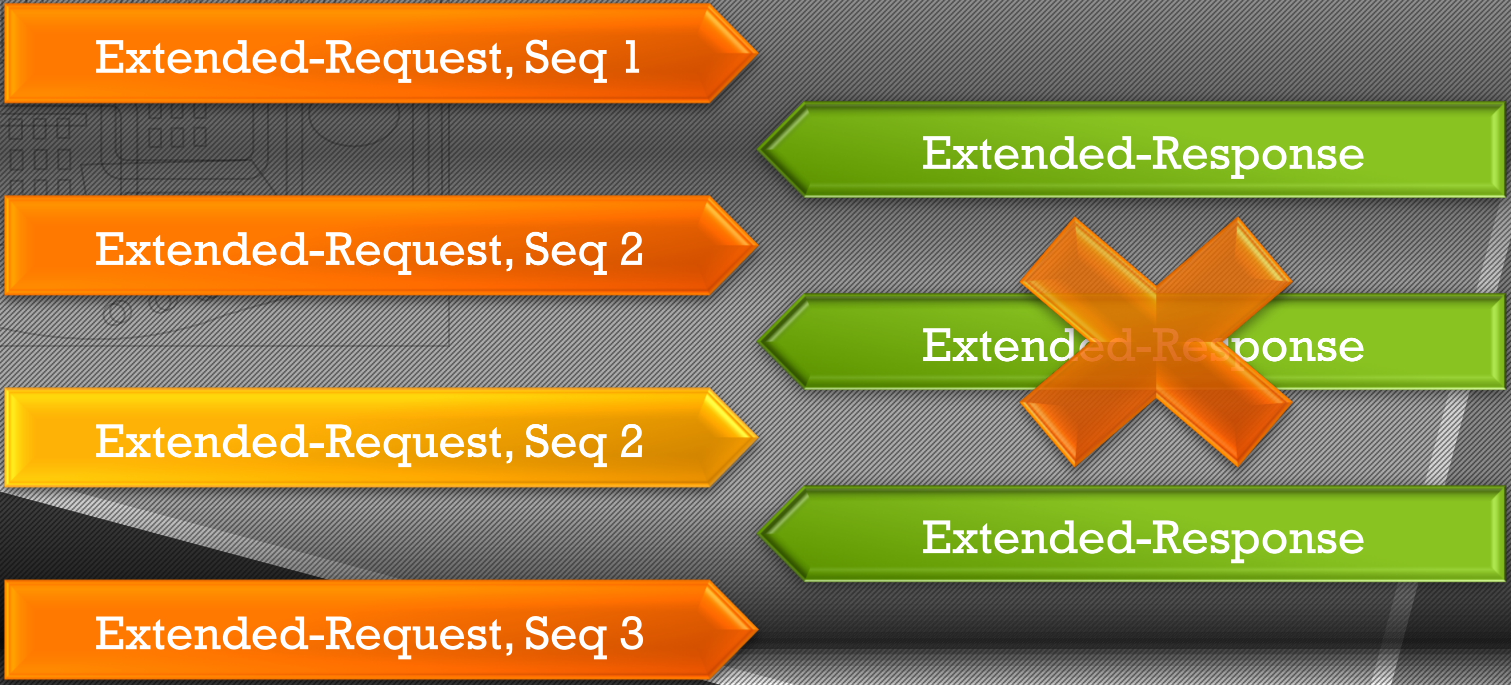
At any time if response is not received last unacknowledged Request or Extended-Request is retransmitted.

2

Acknowledgement of final (More=0) fragment is Extended-Response containing RADIUS response (e.g. Access-Accept)

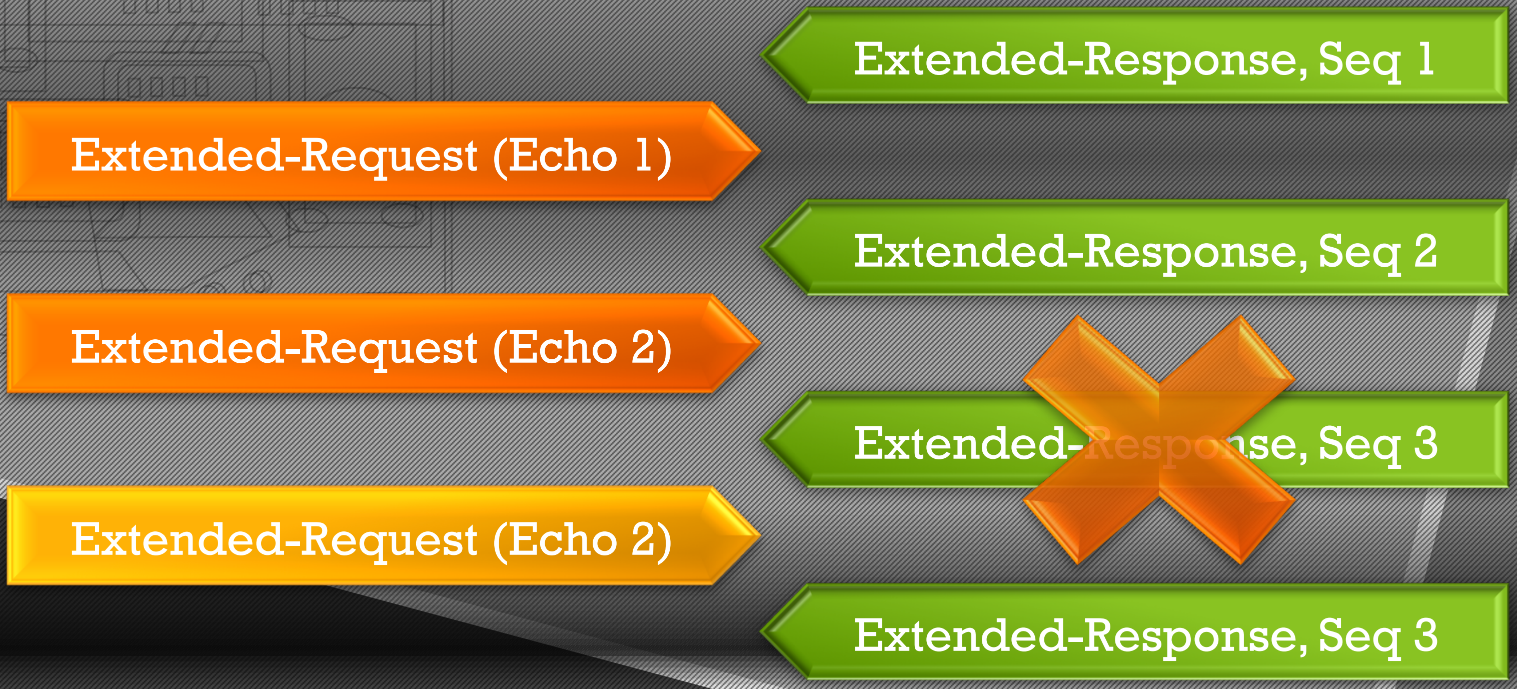
Clients may elect to reduce retry timers when transmitting non-final (More=1) Extended-Requests.

Retransmission Example (Request)



…

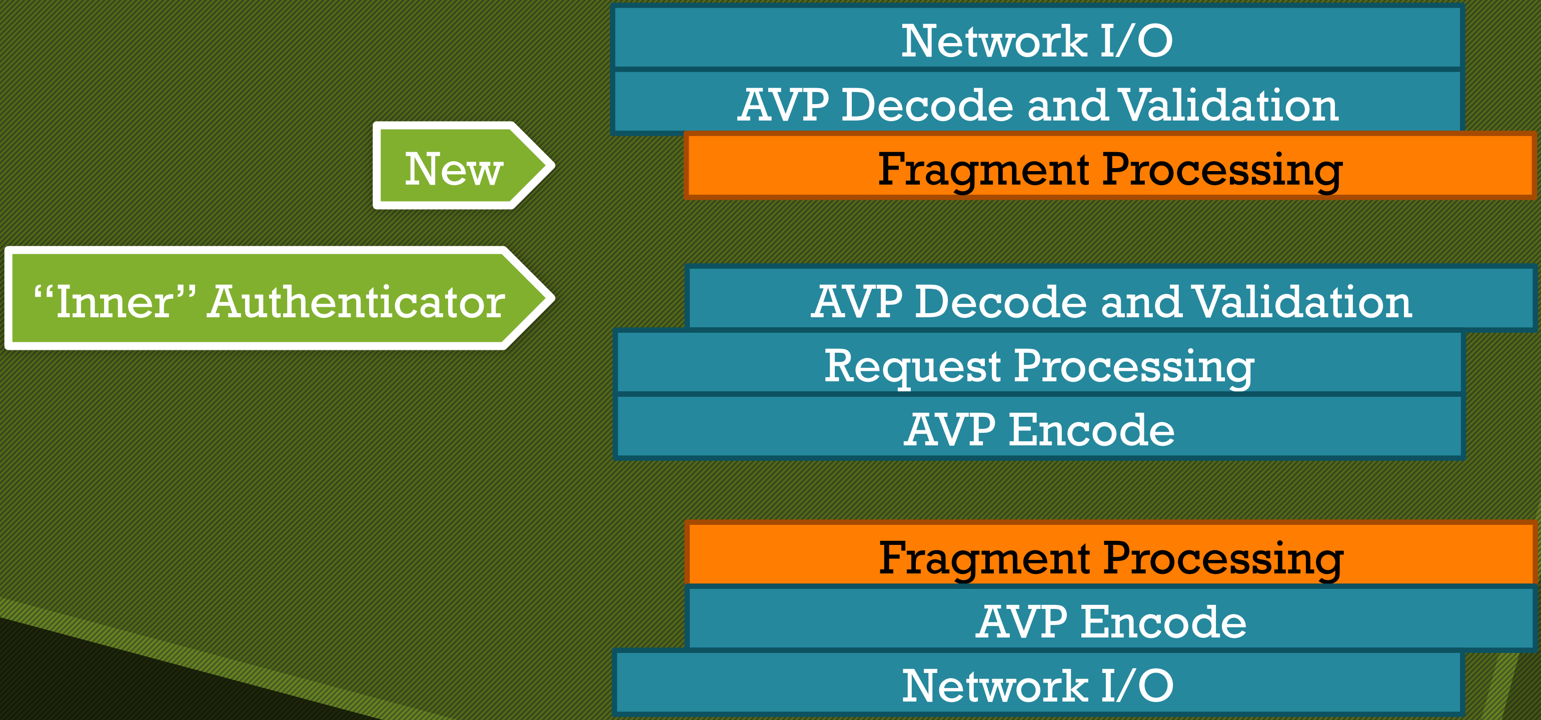
Retransmission Example (Reply)



…

Fragment-Data

Implementation changes?



Fragment-Data

"Inner" Req/Reply Authenticator

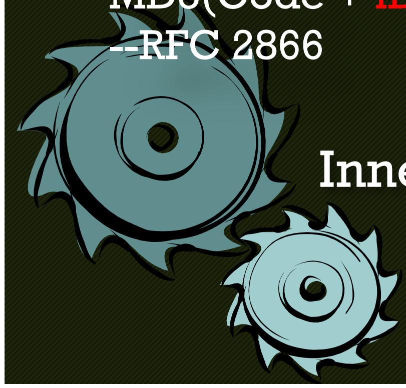
Access-Request
"the Authenticator value is a 16 octet random number" --RFC 2865

Access-Accept, Access-Reject, Access-Challenge
"MD5(Code + ID + Length + RequestAuth + Attributes + Secret)" --RFC 2865

Message-Authenticator
"HMAC-MD5 [RFC2104] hash of the entire Access-Request packet, including Type, ID, Length and Authenticator, using the shared secret as the key"
--RFC 3579

Accounting-Request, Disconnect-Request, CoA-Request
MD5(Code + ID + Length + 16 zero octets + request attributes + Secret)
--RFC 2866

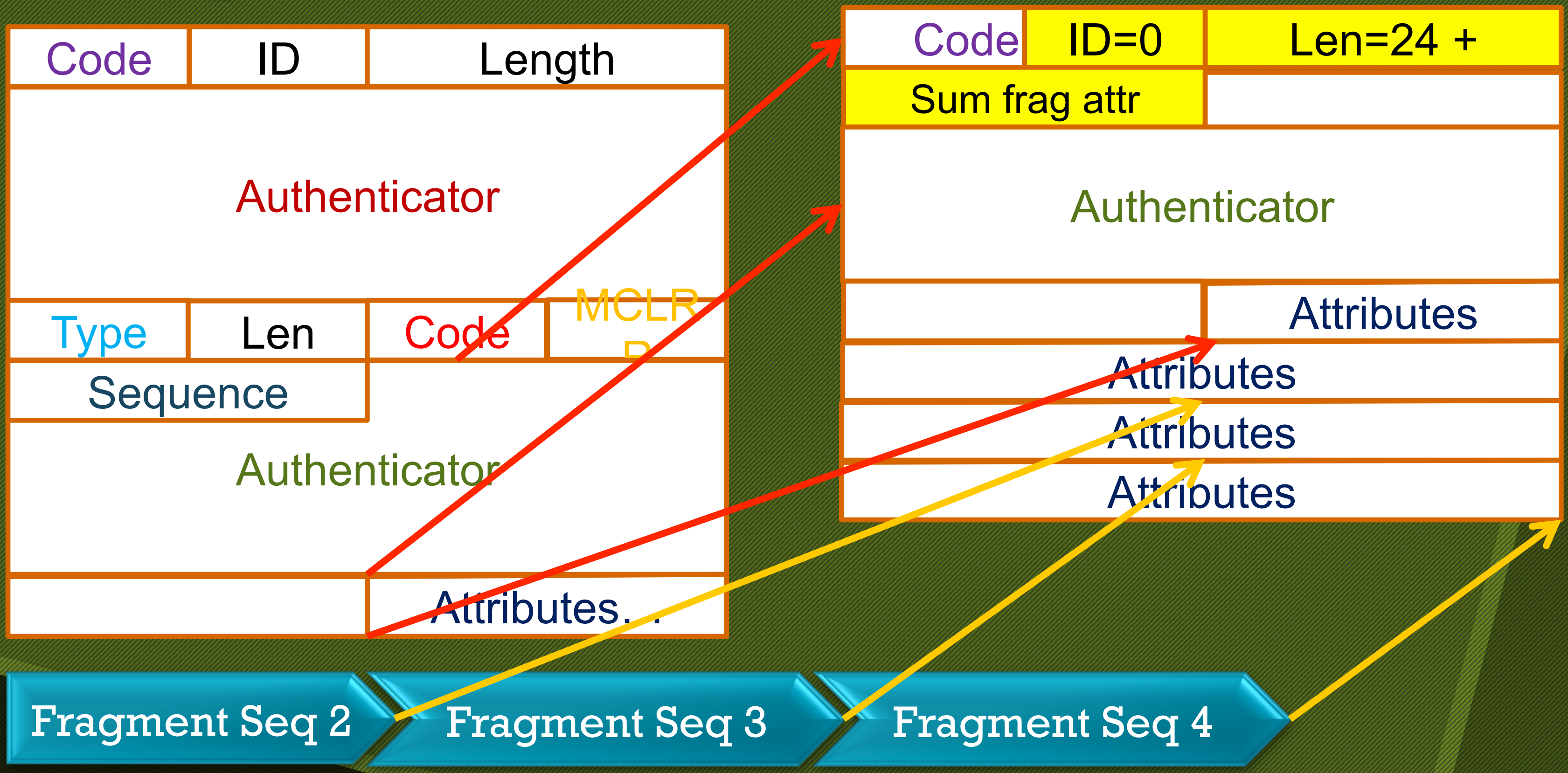
Accounting-Response, Disconnect-ACK/NAK, CoA-ACK/NAK
MD5(Code + ID + Length + RequestAuth + response attributes + Secret)
--RFC 2866



Inner packet generated normally with ID field set 0.

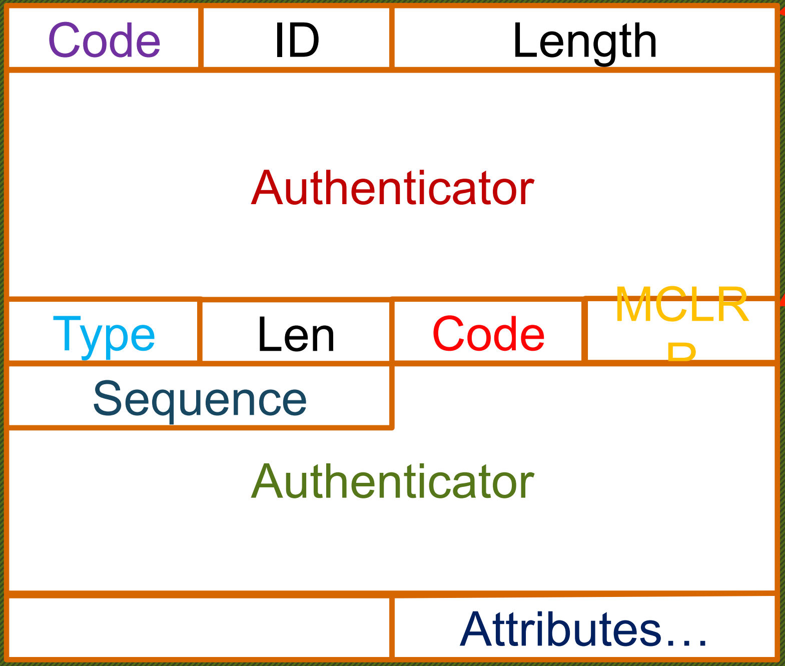
Fragment-Data

Constructing the "Inner" Packet



Fragment-Data

"Outer" vs. "Inner" Processing



+-+-+-+-+-Outer Packet-+-+-+-+-+

Consumes head attribute (Fragment-Data) only.

ALL additional attributes are appended to "Inner" request byte for byte with no changes.

AVP length fields validated against total "Outer" packet length. No checking is done with respect to type or content of attributes at this stage.

+-+-+-+-+-Inner Packet-+-+-+-+

Once all fragments are assembled inner packet is constructed and processed normally as if received on "wire".

Fragment-Data

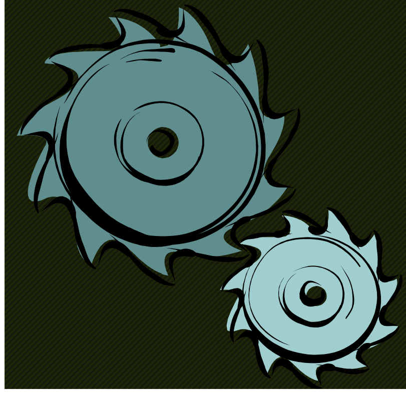
RADIUS Response Options

Responding to Fragmented Request

- The “Inner” Fragmented request (Authenticator) is used to produce Fragmented response.

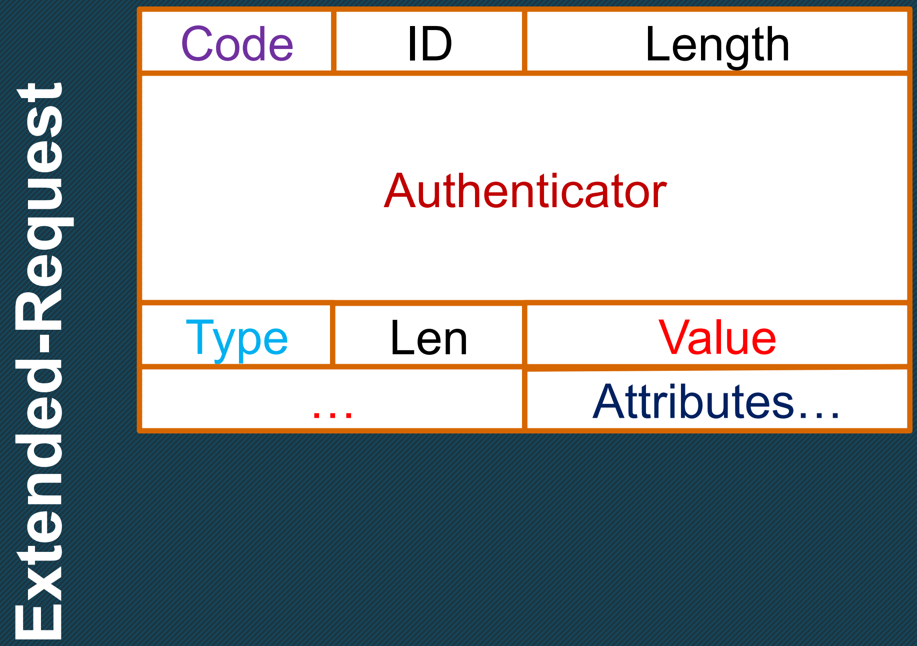
Responding to Non-Fragmented Request

- Non-Fragmented request (Authenticator) is used to produce either a Fragmented or Non-Fragmented response.



Fragment-Inquire

Requesting fragment related parameters from server



Code = Extended-Request
ID, Len, Authenticator = Same as **Accounting-Request**

Type = Fragment-Inquire
Value = 1

Attributes = Optional client fragment related parameters communicated to server. To be used only with session based transport.

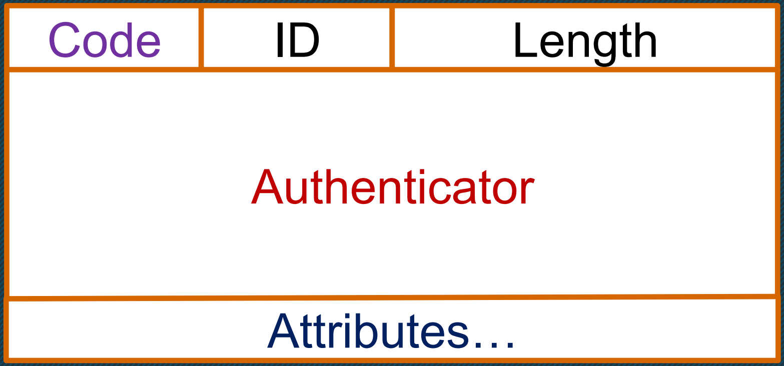
Optional Request Attributes

Fragment-Stream-Limit	Client is capable of receiving response packets up to length indicated
Fragment-Reply-Supported	Client is capable of receiving fragmented response packets

Fragment-Inquire

Providing fragment related parameters to client

Extended-Response



Code = Extended-Response
ID, Len, Authenticator = Same as **Accounting-Response**

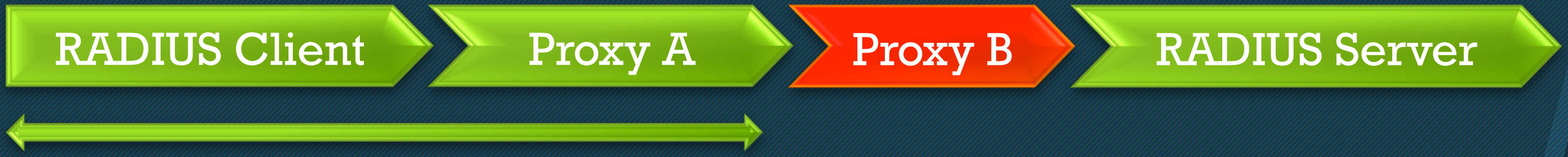
Optional Response Attributes

Fragment-Reply-Allowed	Server implements Fragment-Reply-Supported attribute (Section 6.1)
Fragment-Stream-Limit	Maximum RADIUS packet length supported by server over TCP
Fragment-Limit	Maximum fragmented inner packet length supported by server
Fragment-Inquire-Interval	Interval at which server recommends clients poll for parameter changes
Framed-MTU	Server MTU hint
Event-Timestamp	Server time of Extended-Response

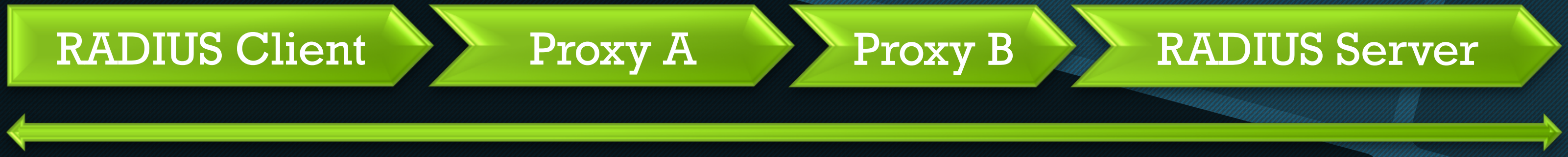
Fragment-Inquire

Fragment-Reply-Supported is forwarded toward each downstream destination only if downstream has advertised fragment support via Fragment-Inquire response containing Fragment-Reply-Allowed.

RADIUS Server is prevented from generating a fragmented response in the event RADIUS Client or any intermediary (e.g. Proxy B in example below) does not support Fragment-Data.



When RADIUS Client and all intermediaries support fragments then Fragment-Reply-Supported reaches RADIUS Server. Server may then safely issue a fragmented response.



Q & A

Question

How do you proxy a Extended-Request?

Answer

Each "hop" assembles all fragments into an "inner" packet. This packet may then be forwarded by disassembling packet into fragments to next hop.

Q & A

Question

Must all systems in proxy chain support Fragments?

Answer

Unfortunately if any system in the chain does not support fragments then RADIUS packets are limited to 4096 bytes.

Raining on my parade…

Comments, Suggestions and **IDEAS** welcome!!!

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