

LPWAN WG

WG Chairs:

Alexander Pelov <a@ackl.io>

Pascal Thubert <pthubert@cisco.com>

AD: Suresh Krishnan
<suresh@kaloom.com>

Note Well

Any submission to the IETF intended by the Contributor for publication as all or part of an IETF Internet-Draft or RFC and any statement made within the context of an IETF activity is considered an "IETF Contribution". Such statements include oral statements in IETF sessions, as well as written and electronic communications made at any time or place, which are addressed to:

- The IETF plenary session
- The IESG, or any member thereof on behalf of the IESG
- Any IETF mailing list, including the IETF list itself, any working group or design team list, or any other list functioning under IETF auspices
- Any IETF working group or portion thereof
- Any Birds of a Feather (BOF) session
- The IAB or any member thereof on behalf of the IAB
- The RFC Editor or the Internet-Drafts function

All IETF Contributions are subject to the rules of RFC 5378 and RFC 3979 (updated by RFC 4879).

Statements made outside of an IETF session, mailing list or other function, that are clearly not intended to be input to an IETF activity, group or function, are not IETF Contributions in the context of this notice. Please consult RFC 5378 and RFC 3979 for details.

A participant in any IETF activity is deemed to accept all IETF rules of process, as documented in Best Current Practices RFCs and IESG Statements.

A participant in any IETF activity acknowledges that written, audio and video records of meetings may be made and may be available to the public.

Reminder:

Minutes are taken *

This meeting is recorded **

Presence is logged ***

- * Scribe; please contribute online to the minutes at: <http://etherpad.tools.ietf.org:9000/p/lpwan>
- ** Recordings and Minutes are public and may be subject to discovery in the event of litigation.
- *** From the Webex login

Agenda bashing

- 16:05> Opening, agenda bashing (Chairs) [7min]
- Note-Well, Scribes, Agenda Bashing
 - Approval minutes from last meeting
 - Review last interim todos
 - Terminology
- 16:12> LPWAN Overview Presentation and Discussion (Stephen Farrel) [5min]
- <https://datatracker.ietf.org/doc/draft-ietf-lpwan-overview/>
 - Status on Steve's issues on ML
 - Publication?
- 16:17> Static Context Header Compression for IPv6 and UDP (Ana, Laurent) [10min]
- <https://datatracker.ietf.org/doc/draft-ietf-lpwan-ipv6-static-context-hc/>
- 16:27> LPWAN Static Context Header Compression (SCHC) for CoAP (Laurent) [15min]
- <https://datatracker.ietf.org/doc/draft-ietf-lpwan-coap-static-context-hc/>
- 16:42> Static Context Header Fragmentation (Carles) [15min]
- <https://datatracker.ietf.org/doc/draft-ietf-lpwan-ipv6-static-context-hc/>
- 16:57> AOB [QS]

Status

WG formed October 14th

- Charter item #1 (Informational document)
 - Baseline technology description
- Charter item #2 (Standards track document)
 - Enable the compression and fragmentation of a CoAP/UDP/IPv6 packet over LPWA networks

Charter - Milestones

Milestones

Date ⇄ **Milestone**

Jul 2017 Submit CoAP compression mechanism to the IESG for publication as a Proposed Standard

May 2017 Submit IP/UDP compression and fragmentation mechanism to the IESG for publication as a Proposed Standard

Apr 2017 Submit LPWAN specification to the IESG for publication as an Informational Document

Done Adopt CoAP compression mechanism as a WG item

Done Adopt IP/UDP compression and fragmentation mechanism as a WG item

Done Adopt LPWAN specifications as WG item

Last meeting Action items

- JCZ, DD: Review IP/UDP drafts
- CB, MV: Review CoAP draft
- SF: Send revision, WG to review by May, 30th
- CG: CFN/AFN, new ideas around fragmentation

LPWAN Overview

Editor: Stephen Farrell
(many contributors)

Terminology

- Status?
- AAA Server vs Low-Power Backend Server (LBES)
- WG review and good to go?

SCHC Compression

[draft-ietf-lpwan-ipv6-static-context-hc-03](#)

Authors:

Ana Minaburo <ana@ackl.io>

Laurent Toutain <laurent.toutain@imt-atlantique.fr>

Carles Gomez <carlesgo@entel.upc.edu>

SCHC Compression

- Diego Review's
 - "SCHC uses a context where header information is kept in order." Is there any other scheme? Is there is another order?
 - Define the way the information is in the context, at least be clear
 - Just for the sake of clarity, from the introduction, I can deduce this draft only concentrates on a protocol and a mechanism. The protocol is SCHC and the mechanism is Fragmentation. The protocol usage is justified by two properties of LPWANs and the mechanism is justified by the lack of support on part of the LPWAN technologies.
 - My conclusion is, we need to rewrite the introduction.
 - SCHC header compression must be used always and the fragmentation part may be used when needed, I'm not agree about one is a protocol and the other mechanisms or vs.

SCHC Compression

- "A Field Position (FP) indicating if several instances of the field exist in the headers which one is targeted." Expression not clear
 - It is the reference for the header fields
 - Use for CoAP
- "A Target Value (TV) is the value used to make the comparison with the packet header field. The Target Value can be of any type (integer, strings,...). It can be a single value or a more complex structure (array, list,...). It can be considered as a CBOR structure."
Here I have a conflict on the idea of header field and value, when to know each representation
 - The Rule-ID will be used for these cases
- "equal: a field value in a packet matches with a field value in a rule if they are equal" Is any of those values a TV?
 - No, The SCHC C/D are actions in order to decide which information will be sent

LPWAN CoAP SCHC

Authors:

Ana Minaburo <ana@ackl.io>

Laurent Toutain <laurent.toutain@imt-atlantique.fr>

CoAP differences: large values

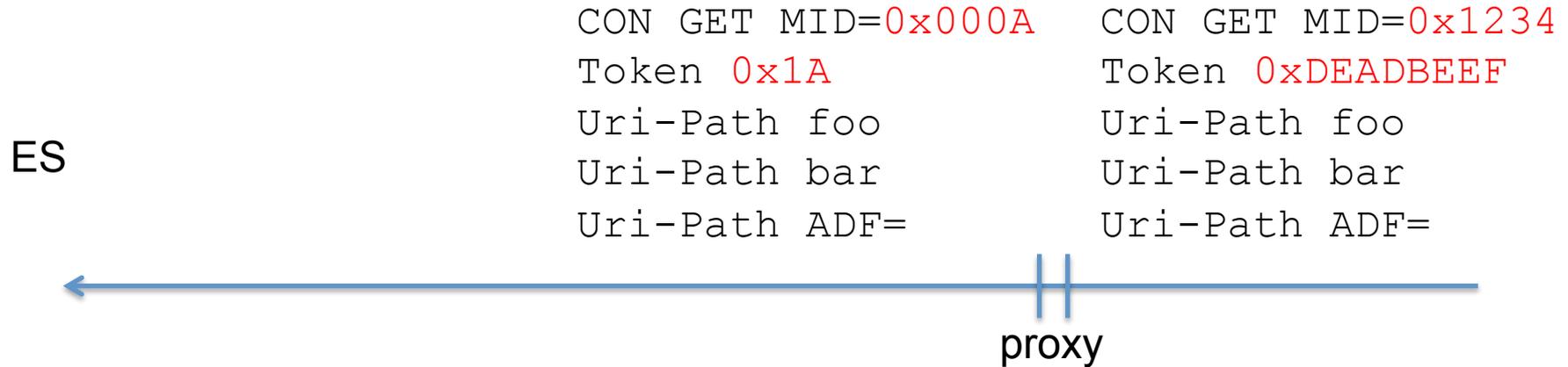
ES (Thing)

```
CON GET MID=0x1234  
Token 0xDEADBEEF  
Uri-Path foo  
Uri-Path bar  
Uri-Path ADF=
```



- Regular CoAP client will use « large » ID
 - May be reduced in LPWAN
- Use Proxy (out of the scope)

CoAP Differences: Proxy to reduce the size



- Regular CoAP client will use « large » ID
 - May be reduced in LPWAN
- Use Proxy (out of the scope)

COAP DIFFERENCES: PROXY REDUCES THE SIZE



ES

CON GET MID=0x000A	CON GET MID=0x1234
Token 0x1A	Token 0xDEADBEEF
Uri-Path foo	Uri-Path foo
Uri-Path bar	Uri-Path bar
Uri-Path ADF=	Uri-Path ADF=

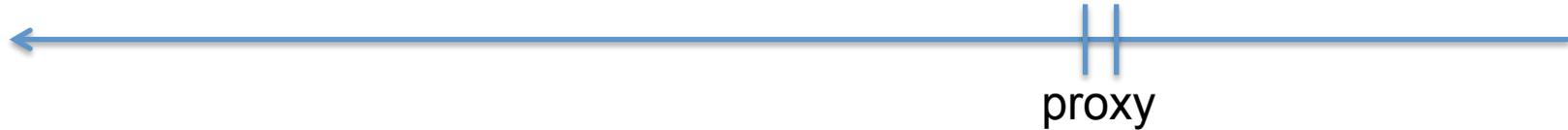


- MID: TV=0x0000 MO=MSB (12) CDF=LSB (4)
- TOK: TV= MO=ignore CDF=value-sent

CoAP differences: multiple fields

ES

```
CON GET MID=0x000A
Token 0x1A
Uri-Path foo
Uri-Path bar
Uri-Path ADF=
```



- /foo/bar is different from /bar/foo
- Add position for MO

CoAP differences: Position in MO

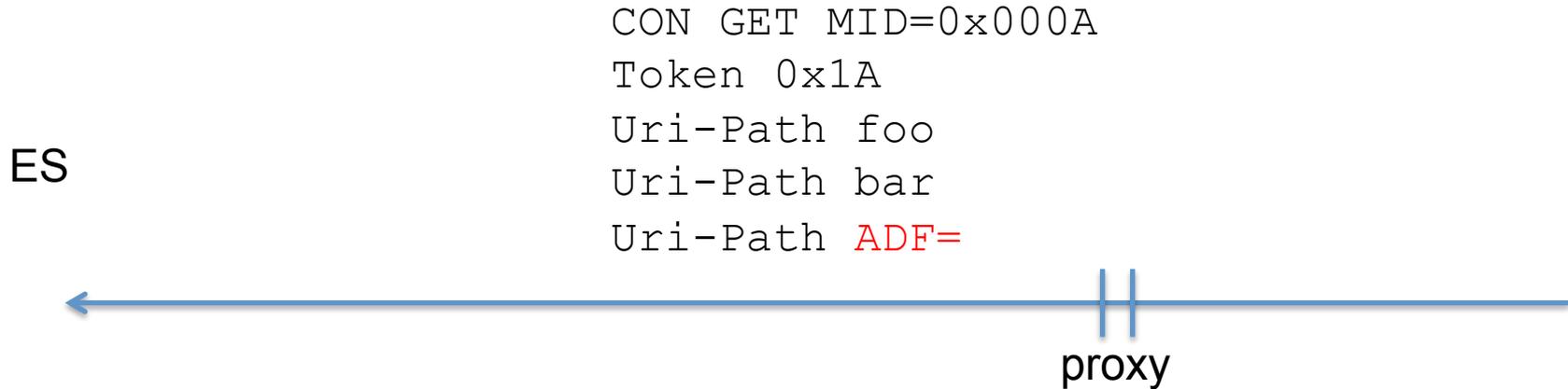
ES

```
CON GET MID=0x000A  
Token 0x1A  
Uri-Path foo  
Uri-Path bar  
Uri-Path ADF=
```



- Uri-Path: TV=foo MO=equal(1) CDF=not-sent
- Uri-Path: TV=bar MO=equal(2) CDF=not-sent

CoAP difference: variable field length (LPWAN))

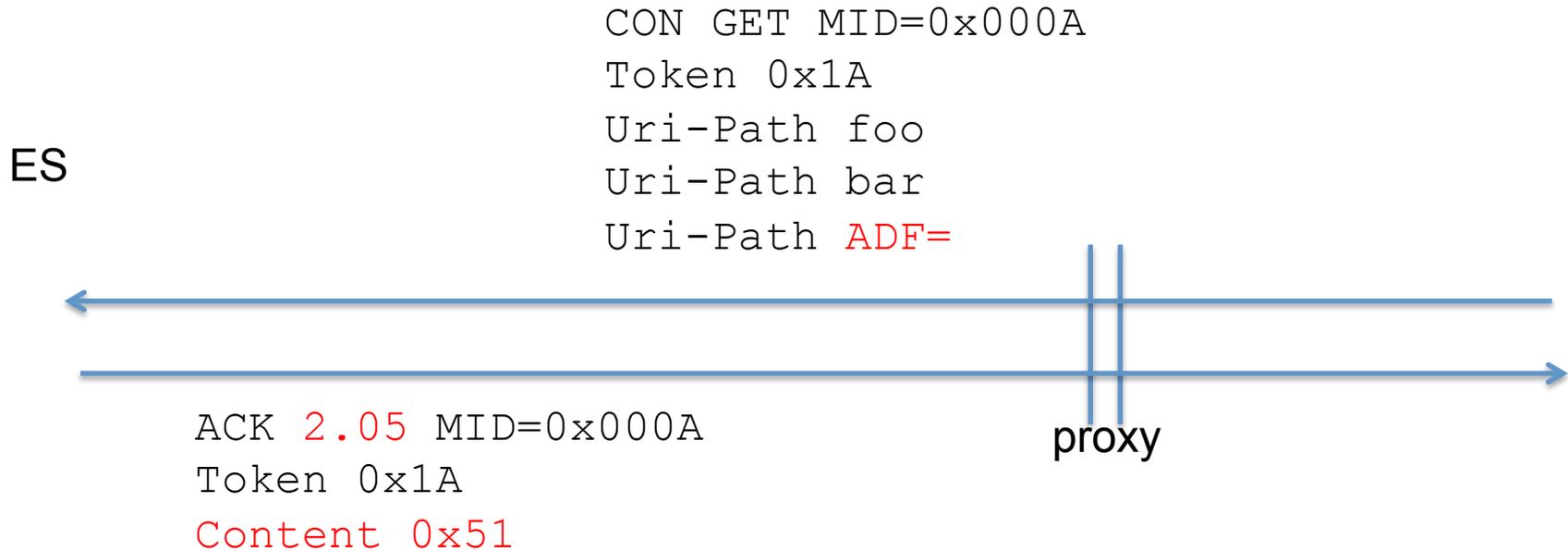


- Variable length:
 - Send CoAP option (including length)

• Uri-Path: TV= MO=ignore(3) CDF=value-sent

CoAP differences: asymmetry

LPWAN



value

Direction in the entry rule

- A new entry in the rule:
 - ▶ Upstream
 - ▶ Downstream
 - ▶ Bidirectionnal (by default)
- MO applies only for the appropriate direction
- Depending of the scenario
 - ▶ Thing is server: request is downstream
 - ▶ Thing is client: request is upstream

Example

```
CON GET MID=0x000A
Token 0x1A
Uri-Path foo
Uri-Path bar
Uri-Path ADF=
```



```
ACK 2.05 MID=0x000A
Token 0x1A
Content 0x51
```

value

FID	TV	MO	CDF	Dir
version	1	Equal	Not-sent	bi
Type	CON	Equal	Not-sent	down
Type	{ACK:0, RST:1}	Match-mapping	Mapping-sent	up
TKL	1	Equal	Not-sent	bi
Code	GET	Equal	Not-sent	down
Code	{2.05:0, 4.04:1}	Match-mapping	Mapping-sent	up
MID	0x0000	MSB(12)	LSB(4)	bi
Token		Ignore	Value-sent	bi
Uri-Path	Foo	Equal 1	Not-sent	down
Uri-Path	Bar	Equal 2	Not-sent	down
Uri-Path		Ignore 3	Value-sent	down
Content	0x51	Equal	Not-sent	up

Example

```
CON GET MID=0x000A
Token 0x1A
Uri-Path foo
Uri-Path bar
Uri-Path ADF=
```

← 4+8+24 = 36 bits →

```
ACK 2.05 MID=0x000A
Token 0x1A
Content 0x51
```

value

FID	TV	MO	CDF	Dir
version	1	Equal	Not-sent	bi
Type	CON	Equal	Not-sent	down
Type	{ACK:0, RST:1}	Match-mapping	Mapping-sent	up
TKL	1	Equal	Not-sent	bi
Code	GET	Equal	Not-sent	down
Code	{2.05:0, 4.04:1}	Match-mapping	Mapping-sent	up
MID	0x0000	MSB(12)	LSB (4)	bi
Token		Ignore	Value-sent	bi
Uri-Path	Foo	Equal 1	Not-sent	down
Uri-Path	Bar	Equal 2	Not-sent	down
Uri-Path		Ignore 3	Value-sent	down
Content	0x51	Equal	Not-sent	up

Example

CON GET MID=0x000A

Token 0x1A

Uri-Path foo

Uri-Path bar

Uri-Path ADF=

← 4+8+24 = 36 bits

1+1+4+8 = 14 bits →

ACK 2.05 MID=0x000A

Token 0x1A

Content 0x51

value

FID	TV	MO	CDF	Dir
version	1	Equal	Not-sent	bi
Type	CON	Equal	Not-sent	down
Type	{ACK:0, RST:1}	Match-mapping	Mapping-sent	up
TKL	1	Equal	Not-sent	bi
Code	GET	Equal	Not-sent	down
Code	{2.05:0, 4.04:1}	Match-mapping	Mapping-sent	up
MID	0x0000	MSB(12)	LSB (4)	bi
Token		Ignore	Value-sent	bi
Uri-Path	Foo	Equal 1	Not-sent	down
Uri-Path	Bar	Equal 2	Not-sent	down
Uri-Path		Ignore 3	Value-sent	down
Content	0x51	Equal	Not-sent	up

CoAP

- No more normative
- Description of CoAP fields compression
 - Work in progress...
- Read it !
- Questions on
 - Block / fragmentation
- Analysis of common exchanges
 - CoMi, LWM2M, IoTivity ?
 - URI-path/Query not flexible: is it a problem?
- Definition of timers:
 - Impact in MID and Token size.

LPWAN SCHC Fragmentation

Authors:

Ana Minaburo <ana@ackl.io>

Laurent Toutain <laurent.toutain@imt-atlantique.fr>

Carles Gomez <carlesgo@entel.upc.edu>

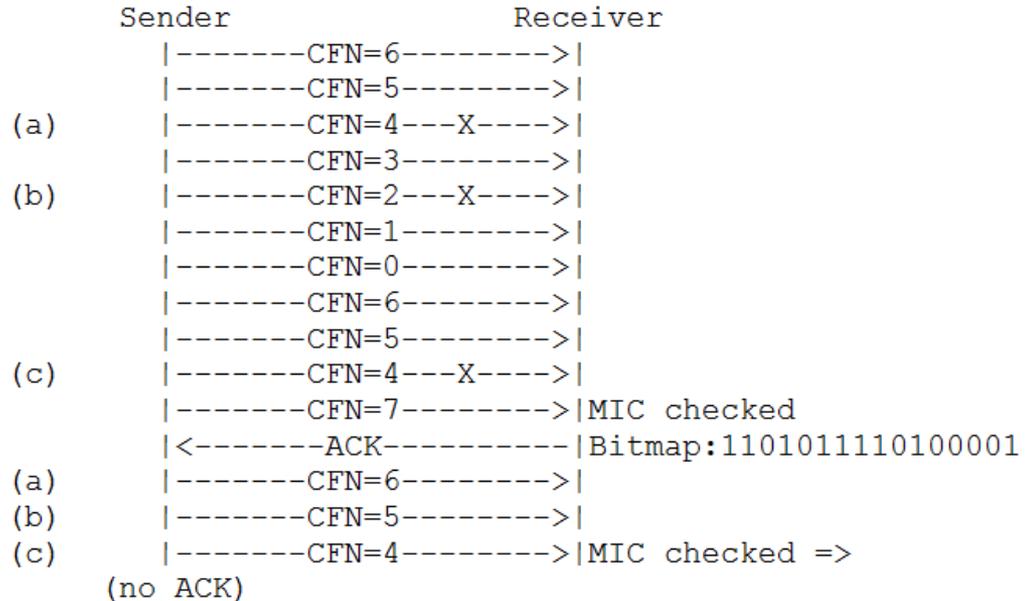
Status

- Updates since the last interim (10th May)
- Available at <https://github.com/lp-wan/ip-compression>
- Thanks for the input/feedback!

- Finishing the document...

Updates

- Packet mode
 - Removed frag header for retries
 - Fragment renumbering



Packet mode: remarks (I/II)

- Zero ambiguity

- LoRaWAN

- EU/China ($N \geq 5$)
 - US ($N \geq 7$)

- Sigfox

- Uplink ($N \geq 7$)
 - Downlink ($N \geq 8$)

As it is right now

- Negligible ambiguity

- $N \geq 4$ (even 3...)

- With frag renumbering

Not a problem in practice!

Packet mode: remarks (II/II)

- Max worst-case currently supported IPv6 packet size
 - LoRaWAN
 - ≥ 1280 bytes (EU/China)
 - < 800 bytes (US)
 - Sigfox
 - < 616 bytes (both uplink/downlink)

As it is right now

Possible future work

- Future doc(s)?
- Possible optimizations for Packet mode
 - ACK format
 - Bitmap (current) vs list vs delta-coded list
 - Multi-PDU ACK
 - Use of fountain codes

Thanks!

Comments?

Authors:

Ana Minaburo <ana@ackl.io>

Laurent Toutain <laurent.toutain@imt-atlantique.fr>

Carles Gomez <carlesgo@entel.upc.edu>