



22 January 2016 Webex

IPv6 over the TSCCH
mode of IEEE 802.15.4e

Chairs:

Pascal Thubert

Thomas Watteyne

Etherpad for minutes:

<http://etherpad.tools.ietf.org:9000/p/6tisch?useMonospaceFont=true>

Note Well

This summary is only meant to point you in the right direction, and doesn't have all the nuances. The IETF's IPR Policy is set forth in BCP 79; please read it carefully.

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- BCP 25 (on the Working Group processes)
- BCP 78 (on the IETF Trust)
- BCP 79 (on Intellectual Property Rights in the IETF)

Reminder:

Minutes are taken *

This meeting is recorded **

Presence is logged ***

* Scribe; please contribute online to the minutes at
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** Recordings and Minutes are public and may be subject to discovery in the event of litigation.

*** From the Webex login

Agenda

- **Administrivia** [3min]
 - Agenda bashing
 - Approval minutes from last meeting
 - rechartering news
- **6LoRH** [25min]
 - draft(s) status (Pascal)
 - ML issues, proposed formats (Pascal, TengFei)
- **6top sublayer** [10min]
 - ML Discussion on recommended formats (TengFei, Xavi)
- **Minimal Draft** [10min]
 - impacts on main text from intro changes (Xavi)
 - Suresh's issues (Xavi)
 - Next steps (Pascal)
- **PlugTest** [10min]
 - Walk-through (delta) tests (Maria-Rita)
 - related question about the 6lorh and 6top (all)
- **AOB** [2min]

Administrivia

Rechartering News

- Being examined, 2 A-D reviews, no objection
- Note to fix 6top interface
 - “YANG model of the 6top MIB”
- Benoit:

Looking at this paragraph:

- Produce an Information Model containing the management requirements of a 6TiSCH node. This includes describing how an entity can manage the TSCH schedule on a 6TiSCH node, and query timeslot information from that node. A data model mapping for an existing protocol (such as Concise Binary Object Representation (CBOR) over the Constrained Application Protocol (CoAP)) will be provided. This work depends on the standardization of a method to access management data resources in constrained devices, such as proposed by CoMI or COOL.

I wonder if this paragraph is still accurate?

There is this WG document, for a YANG data model, <https://tools.ietf.org/html/draft-ietf-6tisch-6top-interface-04>, on which I commented during one of the interim call. So the YANG model should be specifically mentioned.

Also, will the WG still produce an information model? If not, "information model" should be removed

6LoRH

News

- Draft split complete
 - [draft-ietf-6lo-paging-dispatch-01](#)
 - [draft-ietf-6lo-routing-dispatch-03](#)
- Tom Phinney's review
 - Also a nit by Xavi
- TengFei's clarifying questions
 - Leftover table in IPHC
 - Formats when no IP in IP

e.g. 6LoRH – RPI only, ICMP

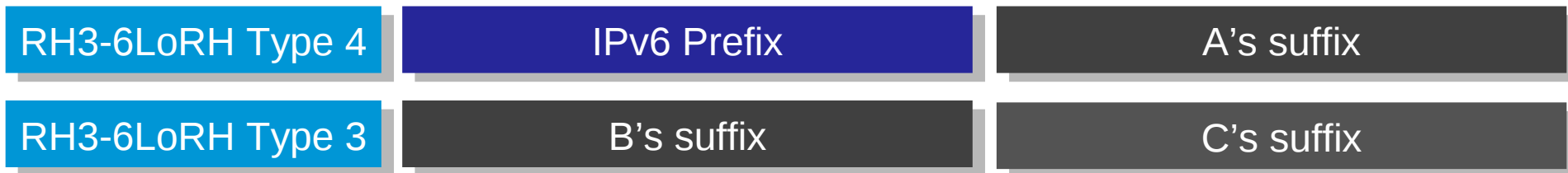
```
+-- ...  +- ...  -+++++ ...  -+++++ ...  -+++++ ...  -+++++ ...  
|11110001| RPI-6LoRH | NH = 0 | NH = 58 | ICMP message  
|Page 1 | type 5 | 6LOWPAN-IPHC | (ICMP) | (no compression)  
+- ...  +- ...  -+++++ ...  -+++++ ...  -+++++ ...  -+++++ ...  
          <- RFC 6282 ->  
          No RPL artifact
```



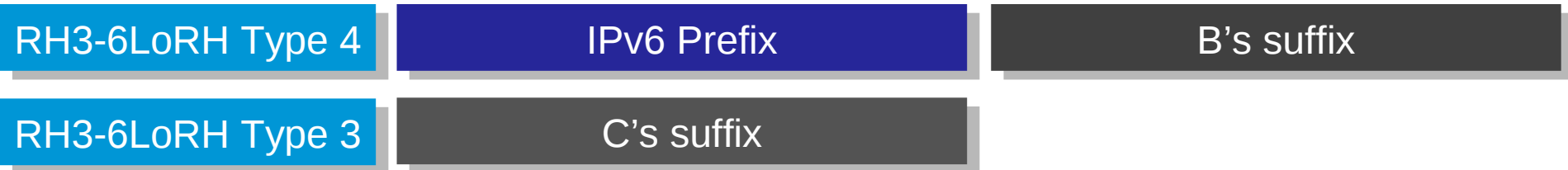
RH3-6LoRH operation



Leaving the root:



Leaving A



Leaving B



C removes the header and the IP-in-IP if nothing else in IP-in-IP

Proposal on the list to use the source of IP header before RH3 as reference

e.g. 6LoRH – from root

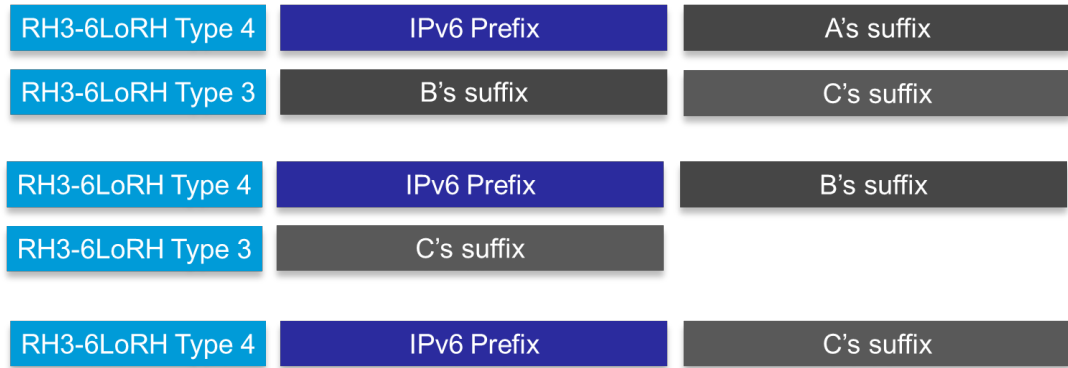
```

+- ... -+-+ ... -+-+--+ ... -+-+--+ ... -+-+--+ ... -+-+--+ ...
|11110001| RH3(128bits)| RH3(2*16bits)| RFC 6282 Dispatch
|Page 1 | 6LoRH type 4| 6LoRH Type 1 | + LOWPAN_IPHC
+- ... +- ... +--+--+ ... -+-+--+ ... -+-+--+ ...

```

<- RFC 6282 ->

Type	Size Unit
0	1
1	2
2	4
3	8
4	16



<=>



e.g. Fragmented 6LoRH – IP-in-IP + RPI

```

+- ... +- ... -++ ... -++ ... +- ... +--+--+--+--+--+--+--+--+...
|Frag type|Frag hdr |11110001| RPI | IP-in-IP | RFC 6282 Dispatch
|RFC 4944 |RFC 4944 | Page 1 | 6LoRH | 6LoRH | + LOWPAN_IPHC
+- ... +- ... -++ ... -++ ... +- ... +--+--+--+--+--+--+--+--+...
                                                    <- RFC 6282 ->

+- ... +- ... -++ ... -++ ... +- ... +--+--+--+--+--+--+--+--+...
|Frag type|Frag hdr |
|RFC 4944 |RFC 4944 | Payload (cont)
+- ... +- ... -++ ... -++ ... +- ... +--+--+--+--+--+--+--+--+...

+- ... +- ... -++ ... -++ ... +- ... +--+--+--+--+--+--+--+--+...
|Frag type|Frag hdr |
|RFC 4944 |RFC 4944 | Payload (cont)
+- ... +- ... -++ ... -++ ... +- ... +--+--+--+--+--+--+--+--+...

```



Proposed order

I think that the original proposal `MAC RH3-6LoRH* RPI-6LoRH IP-in-IP-LoRH IPHC blah` Works better

Reason 1: We modify the RH3-6LoRH on the way, popping the first address as we go. It is easier to do if it is the first header of the compressed packet so we always play with the very beginning of the packet

Reason 2: So that IP header always TERMINATES the 6LoRH encapsulation,

When there is no IP in IP , this is already true for instance `MAC RPI-6LoRH IPHC`

One needs to differentiate a case that in UNCOMPRESSED form is

`IP-in-IP RPI RH3 IP blah` vs. `IP-in-IP IP RPI RH3 blah`

With a format like `MAC IP-in-IP-LoRH RH3-6LoRH* RPI-6LoRH IPHC blah` You cannot tell :(

With this format we have a clear separation for IP in IP in IP all the way

MAC	RH3-6LoRH* RPI-6LoRH IP-in-IP-LoRH	RH3-6LoRH* RPI-6LoRH IP-in-IP-LoRH	RPI-6LoRH IPHC	data
-----	------------------------------------	------------------------------------	----------------	------

The separation of which header is in which encaps is clearly delineation with the IP header that terminates the encapsulated 6LoRH-headers.

UDP packet forwarded by the root

```
+--+--+--+--+--+ ... +--+--+ ... ---+--+ ... -+--+ ... -+--+--+--+--+ ... -+--+--+...
|11110001 |RH3-6LoRH | RPI-6LoRH | IP-in-IP | NH=1 |11110CPP| Compressed | UDP
|Page 1   |Type1 S=2 |           | 6LoRH   | IPHC  | UDP    | UDP header | Payload
+--+--+--+--+--+ ... +--+--+ ... ---+--+ ... -+--+ ... -+--+--+--+--+ ... -+--+--+...
          <-8bytes->                <-          RFC 6282          ->
                                   No RPL artifact
```

One may note that the RPI is provided. This is because the address of the root that is the source of the IP-in-IP header is elided and inferred from the InstanceID in the RPI. Once found from a local context, that address is used as Compression Reference to expand addresses in the RH3-6LoRH.



Should we propose a way to elide the root in IPHC?

6top sublayer forma

6top Sublayer update

- One byte subID for 6top (IETF recommended document)
 - No subId length, subId type
- No termination IE at the end of 6top packet.
 - According to IEEE802.15.4e and IEEE802.15.4-2015

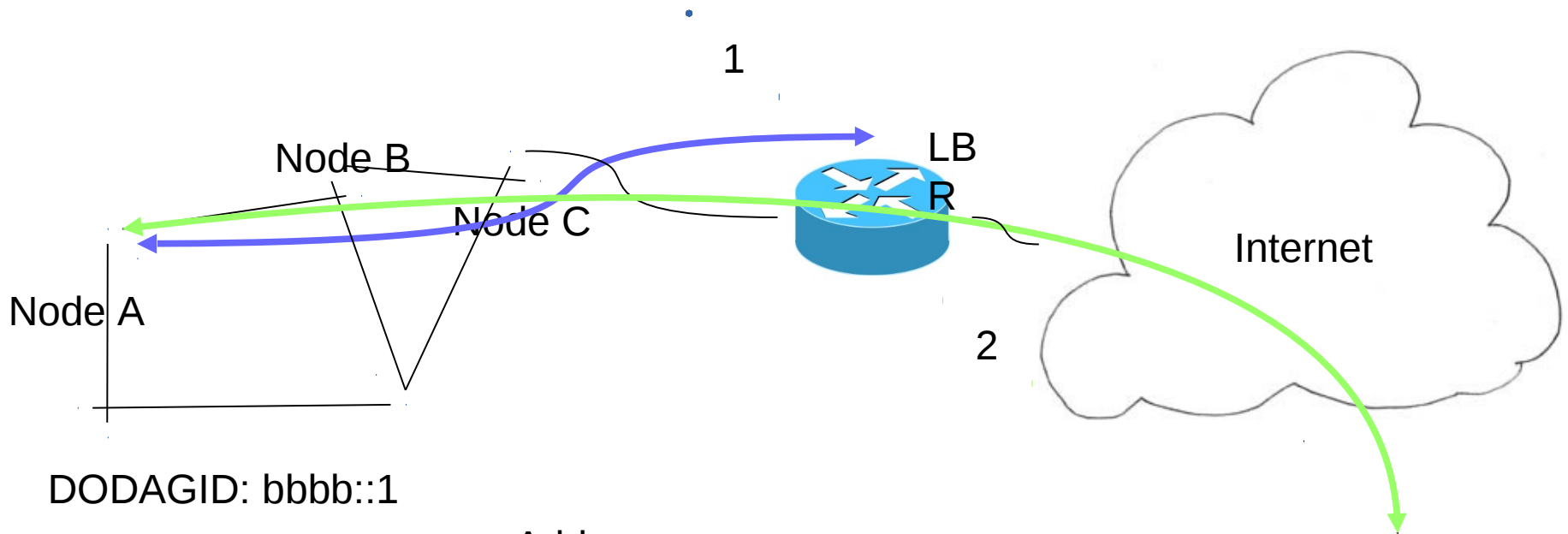
Format of 6p command

General Format of 6p command

Bits: 0-10	11-14	15	16-23	24-27	28-31	32-39	octets
Payload IE content Length	Group ID	Type (0b1)	Sub-type ID	Ver	Code	SFID	Other field
Payload IE			Payload IE Content				

6LoRH Packet Questio

6LoRH Scenarios



DODAGID: bbbb::1

Address

LBR: bbbb::1

User: aaaa::1

Node A:

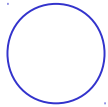
bbbb::1122:3344:0:4

Node B:

bbbb::1122:3344:0:3

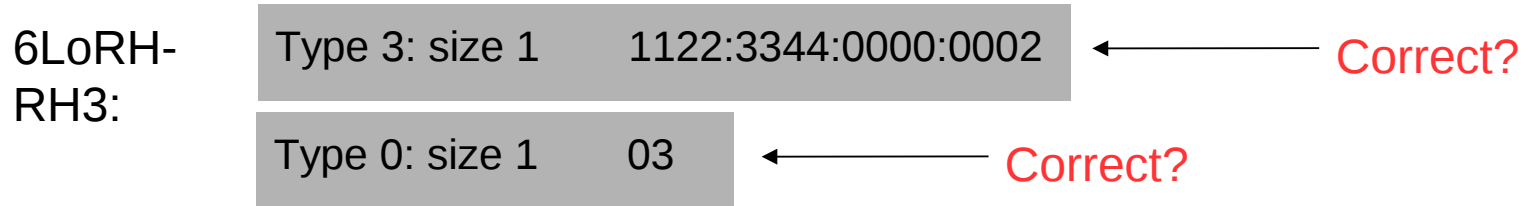
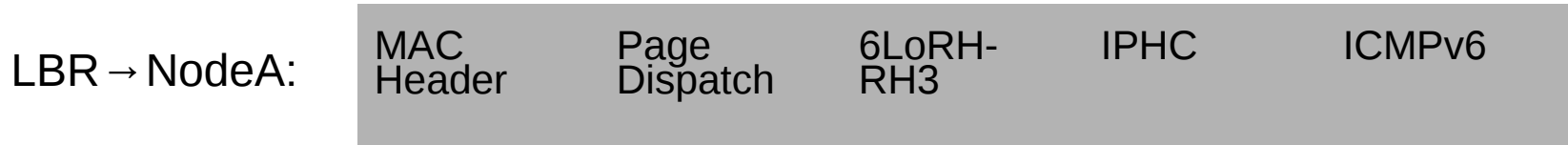
Using source address in IpinIP 6LoRH as
reference

Packet Format with RPL domain



Source Address: bbbb::1122:3344:0000:0004

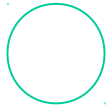
Destination Address: bbbb::1



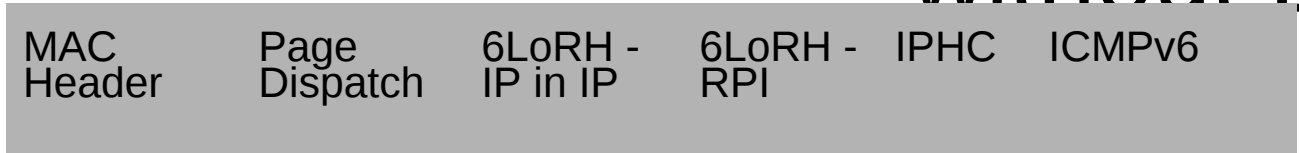
Source Address: bbbb::1 ← Compress Reference (in IPHC)

Destination Address: bbbb::1122:3344:0000:0004

Packet Format without LLN



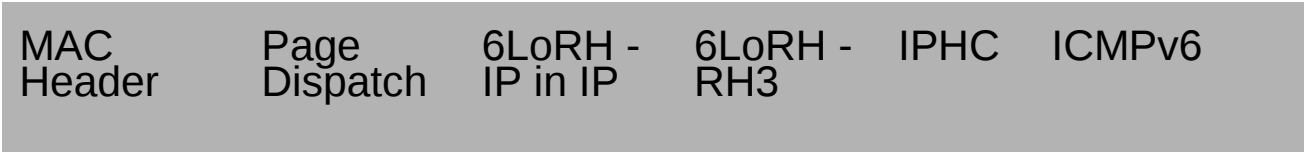
Node A → LBR:



Source Address: bbbb::1122:3344:0000:0004

Destination Address: aaaa::1

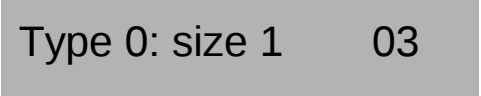
LBR → NodeA:



6LoRH-
RH3:



← Correct?



← Correct?

Source Address IpinIP: bbbb::1 ————— Compress Reference (in IpinIP 6LoRH)

Source Address: aaaa::1

Destination Address: bbbb::1122:3344:0000:0004

6top-sublayer

6top-sublayer

Minimal draft

PlugTest

Admin is trivia

- Approval Agenda
- Approval minutes

AOB ?

Thank you!