RFC 7967

About the first indigenous contribution to IETF Standard from India

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Brief background and problem statement

- TCS Research, Kolkata was working on communication protocols for IoT/M2M specific constrained environments
  - Constrained devices
  - Constrained networks
  - Closely following standardization efforts
- Efforts to improve performance under specific scenarios
  - Increase scalability; Reduce communication cost, latency
- Initial problem statement: How to improve the overall system performance for series of independent updates with the information producer acting as a RESTful client
  - Enhance throughput without degrading the application level QoE beyond a desired level
  - Example use case: GPS updates in a vehicle tacking solution

Brief background and problem statement (contd …)

- Had an existing HTTP based RESTful solution
  - Too much delay
  - System freeze
  - Battery drain out (sensor G/W attached to car battery)

Solution approache: Step by step progress to conceiving RFC 7967

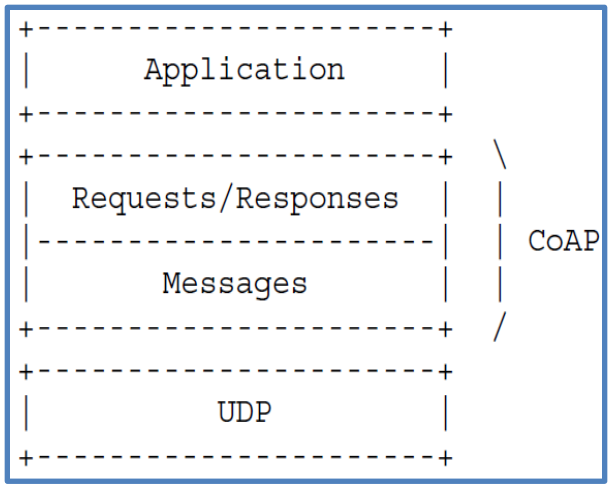
- Packet dissection proved HTTP to be too heavy on resources
  - Note: System operated over just a 2.5G data connection
- Constrained Application Protocol (CoAP, RFC 7252) from Constrained Restful Environment (CoRE) WG was at a nascent stage of standardization
  - 'Web-enable' resource-constrained devices for IoT by allowing exchanges similar to RESTful web-services on LLN and resource constrained nodes
- Tried an open-source implementation of that early version of CoAP from University of Bremen
- system performance improved – but at times (busy hours) system still stalls for a while for ACKs – there are retransmissions as well – but actually that is because of delayed arrival of ACK

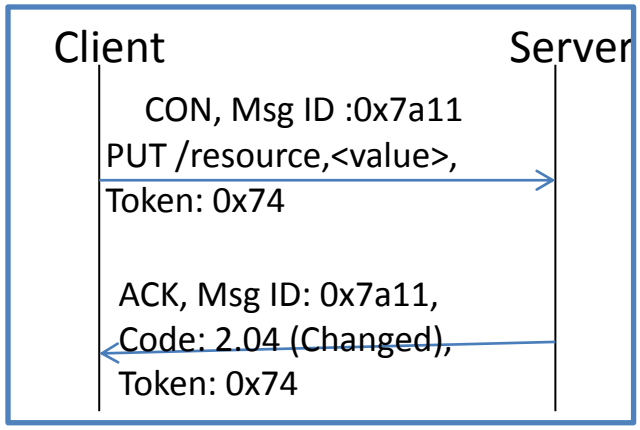
Solution approache: Step by step progress to conceiving RFC 7967 (contd..)

- Give it a thought – why is it important to receive application responses and server ACKs for a location that you have already passed by?
- Push the GPS update at a higher rate when vehicle moving fast – a sporadic loss can be quickly compensated by a next successful reception at the server
- When vehicle moving slow, push GPS update at a slow rate but ensure server responses
- So, contextually switch the semantics

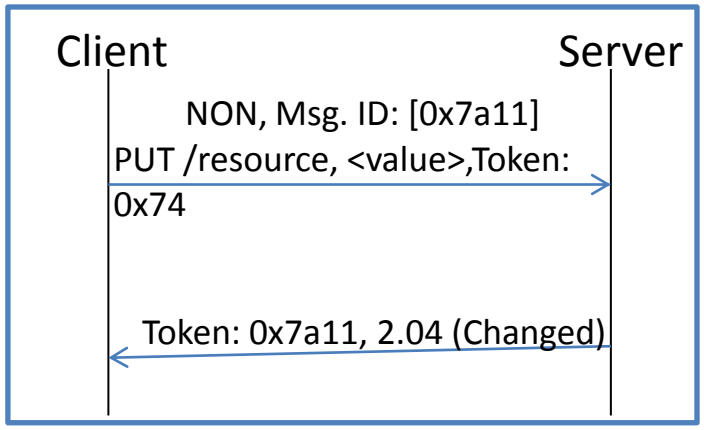
Solution approache: Step by step progress to conceiving RFC 7967 (contd..)

- CoAP allows both Confirmable (CON) and Non-confirmable (NON) update requests
- But, NON requests are still a closed loop system at the application level
  - Server application will send back the state of execution of the request on the resource
  - That's not an ACK from the messaging layer - that's a response from the request/response layer





Confirmable exchange



Non-confirmable exchange

Field experiment setup (driven across Biswa Bangla Sarani)

RFC 7967 …Client option to proactively requesting the server to suppress the request execution status

Number	C	U	N	R	Name	Format	Length	Default
258		X	-		No-Response	uint	0-1	0

- Allowing response suppression at a more granular level – typically useful in optimizing the response traffic against a multicast request
  - Triggered by requirements from the connected lights industry

Value	Binary Representation	Description
0	<empty>	Interested in all responses.
2	00000010	Not interested in 2.xx responses.
8	00001000	Not interested in 4.xx responses.
16	00010000	Not interested in 5.xx responses.

Example handshake

```
Client Server
|       |
|       |
+------>| Header: PUT (T=NON, Code=0.03, MID=0x7d38)
| PUT   | Token: 0x53
|       | Uri-Path: "vehicle-stat-00"
|       | Content Type: text/plain
|       | No-Response: 26
|       | Payload:
|       | "VehID=00&RouteID=DN47&Lat=22.5658745&Long=88.4107966667&
|       | Time=2013-01-13T11:24:31"
|       |
[No response from the server.  Next update in 20 s.]
|       |
+------>| Header: PUT (T=NON, Code=0.03, MID=0x7d39)
| PUT   | Token: 0x54
|       | Uri-Path: "vehicle-stat-00"
|       | Content Type: text/plain
|       | No-Response: 26
|       | Payload:
|       | "VehID=00&RouteID=DN47&Lat=22.5649015&Long=88.4103511667&
|       | Time=2013-01-13T11:24:51"
```

The spec takes care of design guidelines to …

- Avoid congestion despite being “RESTfully” best-effort. ☺
- Define proxy behaviour between HTTP and CoAP

More Use Cases

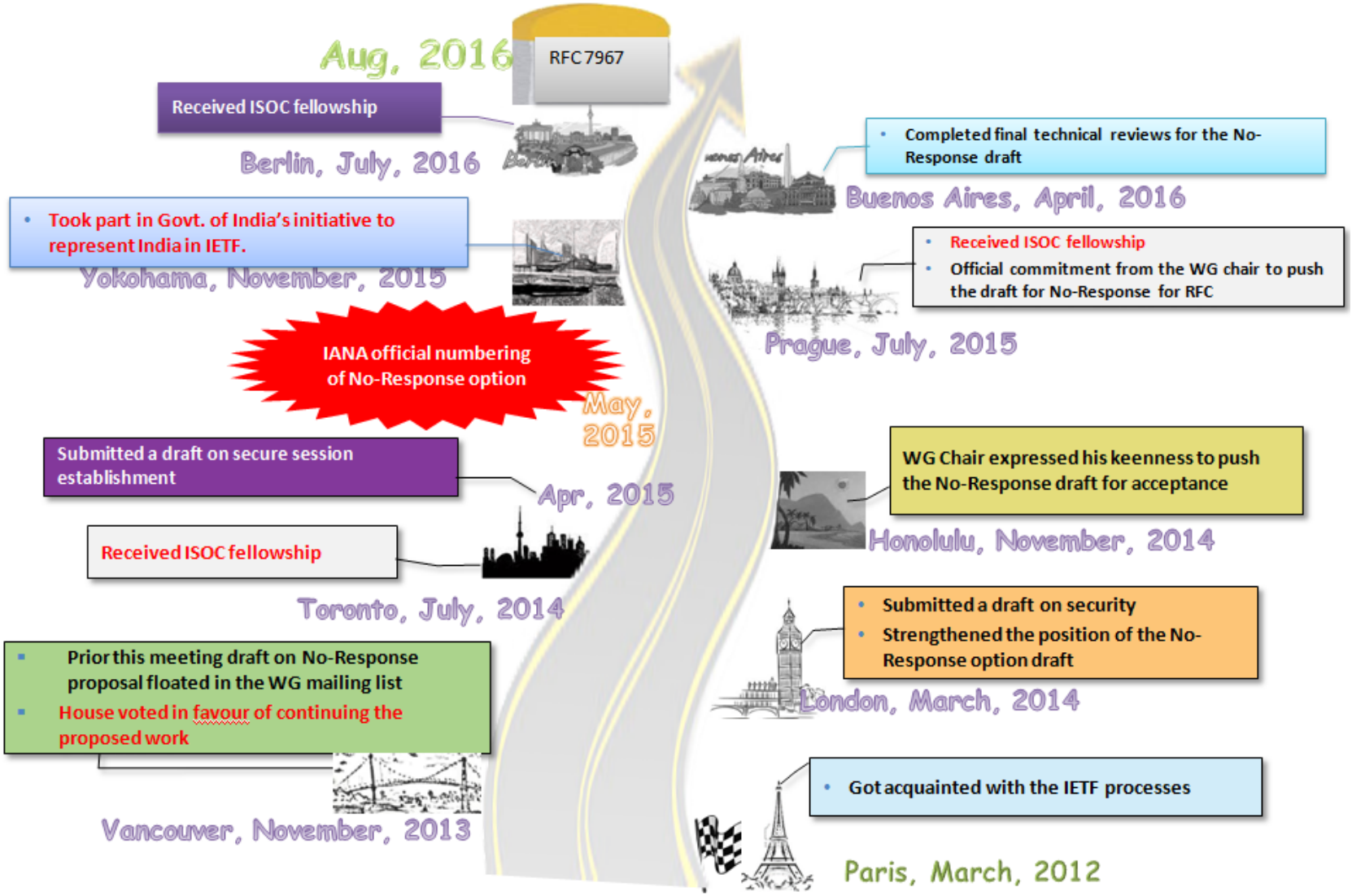
- Connected lights
  - RFC 7967 is used in OpenAIS standard for Solid State Lighting System
  - Optimizes traffic for multicast switching
  - Helps system-level debugging
- Higher layer control signaling for Low Power WAN (LPWAN)

RFC 7967 – In short

- Available at: https://tools.ietf.org/html/rfc7967
- Deals with IoT/M2M use case
- Adds an option (#258) as an enhancement to CoAP (Constrained Application Protocol) at the CoAP-client
- Enables an IoT implementations to extremely reduce the server and network load
- Improves trade-off between delay and reliability
- Client initiated suppression of application-level response at the server in a RESTful exchange

- Available implementations – libcoap, aicoap ….
- Use cases so far
  - GPS updates, Connected lights, LPWAN signalling
  - Recently being used in intelligent video streaming solution for remote constrained surveillance bots/ UAVs
    - Video is nothing but a time series information

The journey


Aug, 2016
RFC 7967
Received ISOC fellowship
Berlin, July, 2016
Completed final technical reviews for the No-Response draft
Buenos Aires, April, 2016
Took part in Govt. of India's initiative to represent India in IETF.
Yokohama, November, 2015
Received ISOC fellowship
Official commitment from the WG chair to push the draft for No-Response for RFC
Prague, July, 2015
IANA official numbering of No-Response option
May, 2015
Submitted a draft on secure session establishment
Apr, 2015
WG Chair expressed his keenness to push the No-Response draft for acceptance
Honolulu, November, 2014
Received ISOC fellowship
Toronto, July, 2014
Submitted a draft on security
Strengthened the position of the No-Response option draft
London, March, 2014
Prior this meeting draft on No-Response proposal floated in the WG mailing list
House voted in favour of continuing the proposed work
Vancouver, November, 2013
Got acquainted with the IETF processes
Paris, March, 2012

Thank you