TR-369 (USP) and OpenSync™

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Author: Bill McFarland, Chief Technology Officer

The Broadband Forum (BBF) has recently approved a new standard, TR-369. This standard is also known as the Universal Services Platform (USP). The standard is an enhancement to the TR-069 and TR-181 standards. Like the previous standards, TR-369 is focused on managing devices.

The enhancements are to support devices:

- Much greater in number - BBF recognizes the shift from managing a single GW device in each home to managing multiple APs in a mesh network, as well as managing many IoT devices in a given home
- Lighter in weight - IoT devices have limited computing power and memory, which made implementing TR-069 challenging
- Require connection to more than one cloud-based controller on a single device

Technically speaking, the changes made were:

- Use of a binary format (Protobuf) for messages to and from the cloud to greatly reduce message length
- Support of three different transport protocols (CoAP, STOMP, WebSocket), which form session-based connections so are more efficient
- Enhancements to the message security (TLS or DTLS), and tools for granular control of which cloud controllers can access which data and controls within the device

TR-369 does not add any networking or application functions to the devices in which it is used. It provides only enhanced methods for messaging to and from the cloud. TR-369 is actually quite similar in what it does to TR-069, it just does those things more efficiently and more securely.

Comparison to OpenSync™

There are similarities, and significant differences between TR-369 and OpenSync™.

Some similarities:

- Both cover how information is moved to the cloud, and how control information is moved back down from the cloud
- Both utilize the same binary format for information transport: Protobuf
- Both employ transport protocols that form session-based connections for efficiency (CoAP, STOMP, or WebSockets in the case of TR-069, MQTT in the case of OpenSync)
- Both systems provide management for firmware lifecycles and upgrades

Fundamental differences:

While there are similarities, there are substantial differences, large and small. Some of the large differences include:

Support for services - while TR-369 carries the name of "Universal Services Platform" (USP), it does not come with any services beyond just monitoring and controlling the devices that have it. OpenSync has an existing set of true *services* that it supports and can be extended to support more in the future. These services include such things as cyber security, parental controls, physical security, IoT onboarding, and access control. Not only does TR-369 not come with such services, but it is missing many of the basic tools necessary to construct such services. Note that the "access control" that TR-369 provides is about controlling which controller can see which information in a device. The "access control" service that OpenSync provides enables a consumer password and device access control system, analogous to an advanced guest networking capability.

Networking capabilities - a device having TR-369 says nothing about its networking capabilities - nothing about what it can do, or how it can be upgraded to do more in the future. OpenSync devices include a Software Defined Network (SDN) capability based on the leading

open source SDN, Open Virtual Switch (OVS). OpenSync devices can actually do something about the traffic that is flowing through them under control from the cloud. And, because of the flexibility of the SDN system, can do more things over time as new services are deployed simply by configuring the SDN system from the cloud.

Maturity and model - TR-369 is a standard. It was completed just recently, in the second half of 2018. Plugfests are ongoing, and certification will not be available until mid 2019. It is not clear how many different vendors will build implementations and obtain certification. In the plugfests so far, only one vendor, and one test equipment manufacturer are participating. It is not clear if an open source implementation will be made available for it. On the other hand, OpenSync is an open source effort, with version 1.2 publicly available now. OpenSync has been deployed in millions of homes across multiple carriers. It is supported by the three leading networking chipset manufacturers and has been built into a wide variety of gateways, repeaters, and IoT devices by a range of systems suppliers. OpenSync has been operating at scale in the field for over two years.

Technical differences:

There are several technical differences that have a significant impact.

Multiple Messaging Protocols - TR-369 allows the use of any of three messaging protocols: CoAP, STOMP, and WebSockets. While this flexibility might seem an advantage, it can be a liability. The following question and answer are provided in the FAQ on the BBF web site.

> "Do I need to support all of USP's message transfer protocols to be compliant?
> No. Each supported transport is meant for a different core use case. In addition, transport proxy functions are in development that will make co-existence and interoperability of implementations of different transports simple."

The use of different protocols by different devices will invite interoperability issues, and will require controllers to implement, and dynamically select on a per device basis which protocol

to use. Further, the options do not seem to provide any particular benefits. STOMP is a text-based communication protocol (not binary) so it is far less efficient than other protocols. The performance of CoAP and WebSockets is extremely similar, so having both options is not necessary.

CoAP vs. MQTT - it appears that the most common protocol used with TR-369 will be CoAP. OpenSync is based on MQTT, which has several advantages compared to CoAP.

First MQTT runs over TCP, while CoAP runs over UDP. UDP is less reliable in general, and particularly problematic in wireless networks. IoT devices and Wi-Fi repeaters will all be wirelessly connected, so a UDP based protocol is a questionable choice.

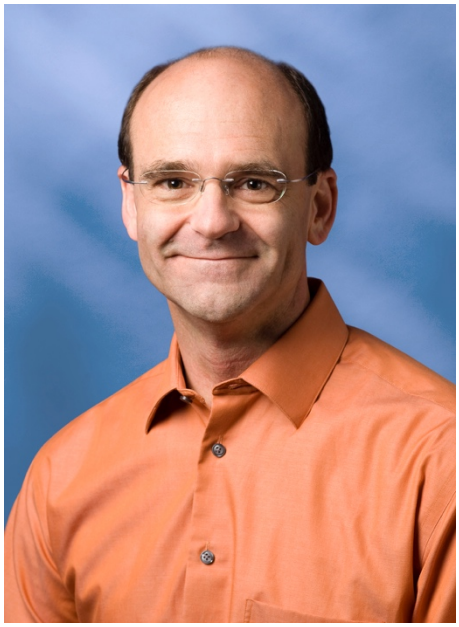
MQTT, through its subscription mechanism, supports many-to-many connections, which is helpful if data being collected from a device is desired at multiple clouds/controllers. CoAP is a one to one protocol, requiring the establishment of multiple connections and sending of multiple copies if the data is to be moved to two different locations in parallel.

Conclusion

While the use of the name "Universal Services Platform" makes TR-369 sound similar to OpenSync, they are quite different. The "Services" envisioned in TR-369 are really just device management, while OpenSync uses "Services" to indicate actual user applications. There are also significant differences in the types of capabilities provided, the maturity of the two solutions, and the underlying technologies.

About the Author

Bill McFarland is the CTO of Plume. He previously was VP of Technology at Qualcomm, and the CTO of Atheros Communications. Bill holds over 70 patents and has authored over 35 technical papers. Bill received a BSEE from Stanford University, and an MSEE from U.C. Berkeley. Bill was elected fellow of the IEEE in 2014.



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