

Report of the Next Steps in Signaling BOF

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2. Abstract

The Transport Area Directors held a Next Steps in Signaling birds of a feather session during the 50th IETF meeting in Minneapolis, Minnesota. The aim of the session was to garner an initial set of requirements for a next generation Internet signaling protocol. This memo is a summary of the input we received during that session.

3. Published NSIS BOF Description

"There have been a number of proposals for a new IETF signaling protocol which is potentially simpler than RSVP, and that is potentially easier to apply to the many uses of signaling beyond RSVP's original use in setup of quality of service. This BOF will attempt to get an understanding of the applications for such a signaling protocol and to explore the possible alternatives for a new effort; both modifying an existing IETF signaling protocol and developing a new one will be considered."

4. Session Description

The session began with comments from a series of people who had been specifically invited to speak and then the microphone was opened for anyone else who wanted to offer their suggestions. Each speaker was limited to a maximum of 3 minutes although most took less than their allotted time.

The speakers are identified here not to cast blame but instead to give credit and to identify who could be tapped for more information on a particular suggestion.

5. BOF Introduction (Allison Mankin)

There are many existing signaling protocols at the IETF

- RSVP
- RSVP Core & children for DiffServe
- RSVP for traffic engineering
- COPS

In addition there is work on new signaling protocols

- General QoS signaling & RSVP in mobile network
- Possible signaling protocol use for midcom
- Extending thinking about signaling in ccamp context

IETF Requirements Process

- WG requirements development often isolated
- Requirements are gleaned not only from working group discussions & from other groups
- Missing is an understanding of what are the overarching requirements
- Interpretation of requirements can benefit from whole picture processing
- e.g. some requirements turn out to be for essentially faster-than-light signaling. ti -2 - some requirements say "conform to these RFCs" -- that's not what we want - we want to know what the actual needs are

Signaling" has different meanings depending on context. We won't define signaling. Please listen closely to see how people presenting define their requirements and try to understand what they mean by signaling.

This BOF starts the requirements gathering process for future IETF work on signaling.

A number of individuals were asked to express one requirement for signaling in the Internet that they have a unique perspective on.

6. Invited Speakers

6.1 Jon Crowcroft

Signaling for QoS and path setup must interact with routing. You cannot layer signaling on routing or routing on signaling. We have L2 mechanisms for signaling but no routing, and L3 mechanisms for routing, but no signaling. So we must think recursively about planning and topology.

6.2 Bruce Davie

We need better support for Qos, specifically, for voice applications. 2 examples: (1) Call-waiting support: you would like to only have to reserve *one* set of resources, since you can only talk to one person at a time. RSVP can't do that today (2) You might (in fact, probably would) like to *request* resources before dialing, but not but not actually use those resources until the call is answered.

6.3 Christian Huitema

I'm not a believer in signaling, especially in the core. Concentrate signaling where it is most useful: in the access (last but one hop in network) Today, in the access loop the outbound (sending) direction is already under the user's control. But the other direction is not, and this creates problems sometimes (e.g. denial-of-service). Specifically, a receiver should be able to control what it RECEIVES from the network, and it should be able to do this without having to cooperate with the sender. This is important for handling Denial-of-Service attacks.

6.4 Georgios Karagiannis

Need to introduce IP based transport in mobile access networks. Must support resource reservation signaling that take into account network and radio characteristics in 2G and 3G networks. Examples are bi-directional reservation, edge to edge, reservations, scalability, unicast transmission, and efficient bandwidth utilization to minimize transmission costs. Note that radio access may be very delay sensitive even if the application itself is NOT delay sensitive.

6.5 James Kempf

Radio access networks - air is expensive. Optimize by using less bandwidth and more (for example) CPU cycles. Whatever the signaling protocol is, it must be very efficient for mobility. Providers pay big \$\$ for the airwaves, they don't want to use it for signaling, but for user data. Best: do the signaling through the backbone, and not over the air if possible. The signaling must be efficient for mobility to minimize signaling while moving from area to area. Mobility signalling should be directly coupled to the traffic.

6.6 Kireeti Kompella

From the Sub-IP point of view the two biggest requirements are for fast notification of errors in a previously set up path and fast rerouting of paths.

6.7 Rajiv Koodli

When a mobile node changes its IP point of attachment, the path that packets take will change. Nodes in new path may need to be signaled. Any mobility-aware signaling protocol should be able to make use of intrinsic IP mobility signaling. Any such protocol must limit signaling to only those parts of the network that are affected.

6.8 Ping Pan

The real scalability problem is "manageability":

- need to shrink the number of reservations to be managed;
- need to avoid manual configuration;
- need to interface with policy and accounting;
- need good measurements and instrumentation.

This implies that no "manual configuration", a smaller number of states, the use of policy, and having good measurement instrumentation are the requirements for the new signaling protocol.

6.9 Brian Rosen

There is a need to support signaling for large numbers of call reservations where the bandwidth for signaling is restricted. Signaling for 2000-3000 calls per second using end-to-end signaling over low-bit-rate hops is one such requirement. We need resource reservations to support audio and video pipes. The network has multiple millions of end points and is bandwidth-limited at the edges. The reservations have to be hard end-to-end reservations.

6.10 Henning Schulzrinne

We might want a new signaling protocol to do the sorts of things MPLS is being used for, such as setting up paths independent of what routing says on the global scale. Signaling state should be able to dip into the path of IP packets and dip out. The end system should not have to be involved. We need the ability to transparently carry

objects such as pricing detail without the IETF worrying about business policies outside it's control.

6.11 Melinda Shore

So any signaling protocol we design needs to be able to handle signaling to or from a middleboxes in transport layer e.g. firewalls and NATs. Either the middlebox needs to be aware of applications or vice versa. We've been doing the former -- it doesn't scale, things break, etc.

Data and control paths are separated in apps -- people know this. But in many cases the control path is mediated by some third party (e.g. an ALG or a Call Center or something). Whatever we do here needs to be aware of that fact.

6.12 Mark Stevens

Rather than designing new signaling protocols, what we really need to do is better define the interfaces for existing protocols. What has been seen so far is the requirement for real time feedback into network that runs today without any process control, flat out. We should think about defining and developing descriptions of interfaces, starting with underlying data that needs to be manipulated in this network

6.13 Michael Thomas

A good QoS signaling protocol for a mobile environment should exhibit good local convergence after topology changes. Also, there is a need to understand how Cross-Realm Admission Control / Policy should work.

7. Ad Hoc Speakers

7.1 Dan Grossman

There exists a rich, multidimensional space at performance parameters, security, and "cost" (proxy for resources). There needs to be a way to express this tradeoff in a reasonable way that conveys what both sides need (assuming that the resources are not in infinite supply, so that cost is not a consideration, so that billing can be more intelligent.

7.2 Bala Balagopan

I am at a loss to understand what is happening in this BOF. Are we planning to design a super protocol that satisfies all the varying requirements? My foremost requirement is to clean up RSVP because it is used for purposes other than what it was defined for. I support Kireeti's requirement of a lightweight protocol.

7.3 Kwok Chan

Signaling protocols have different time scale requirements (milliseconds, microseconds, seconds etc). Knowing the time scale requirement may solve the problem by enabling dynamic policies that can be very fast, minimize complexity and are centrally controlled.

7.4 Ludier

A good requirement is the development of a generic QoS mechanism similar to RSVP which is quite generic, unlike Intserv, which has two specific QoS mechanisms. Generic service will rely only on "frame" and is protocol agnostic.

7.5 John Loughney

Privacy and anonymity need to be taken into account. We should be able to deal with multiple "presentations" of an individual.

7.6 Mark Townsley

Close to what the previous speaker said but not exactly: ensure security, integrity of packets. Must be able to signal the security requirements for packets

7.7 Ping Pan

We need to be flexible in our approach. There is no one protocol that is right for all purposes. For example, a signaling protocol involving an end user must be very fast. But reliability/redundancy issues are more important for a signaling protocol between backbone routers.

7.8 Matt Holdridge

The tradeoff is between stateful vs stateless protocols. We don't have to argue for stateful as we know the cons. We do have the capability of building stateless protocols - and that should be the requirement.

7.9 Bob Braden

I've been thinking about the RSVP mess, and have ideas that to do with implementations, not requirements. It may be useful to learn from experience of RSVP to have a proper interpretation of requirements.

7.10 Jim Kempf

There is a need for simple authentication If you look at signaling in RSVP/mobility, it's not good. But if you look at what's required to do authentication in RSVP, it's even worse. We need "extremely lightweight authentication."

7.11 Melinda Shore

Concealing the network topology from the end user is nice, if/when it is possible. But midcom requires exposing network topology to apps.

We need on-the-path signaling, without exposing topology to the edge host.

7.12 Henning Schulzrinne

We need both sender-oriented and receiver-oriented protocols. We need both soft state and hard state protocols, and protocols with in-between state (e.g., "ice cream state", that starts off hard and softens over time), especially. for voice over IP.

7.13 Jon Crowcroft:

Don't fix signaling protocols via new requirements, but give a new direction in signaling requirements. PNNI specifications are excellently written, 3G handoff is excellent, Q.2931 is excellent. Don't start fixing RSVP until you have read all these protocols. We should not reinvent the wheel and waste the time of the IETF.

7.14 Tim Shepherd:

The Internet, or rather the IP networking technology, has come to dominate because of its superiority in one dimension of quality of service over other competing technologies: support of spontaneity. A requirement for signaling, is that it not destroy the good quality of service that raw IP networks already have. I.e., it must still be possible for things to be done between consenting end systems without requiring them to first have a conversation with the network about their intentions.

7.15 John Vollbrecht:

We need auditability and trackability.

7.16 Yves T'Joens

There should be a strict decoupling between protocol and the information it is carrying.

7.17 Aaron Falk

Signaling should work over all kinds of networks, e.g., high error networks, asymmetric networks, slow networks, broadcast networks, unidirectional networks.

7.12 Charlie Perkins

We need to be able to do secure and reliable signaling for anycast groups.

8. Additional Requirements received in Email

8.1 John Loughney

Need simplicity. At the end of the day, a simple protocol stands the chance of succeeding better than a complex one.

8.2 Ken Calvert

I'm looking at signaling requirements for GRA, and of course we'd like not to reinvent any wheels. I'd like to echo Henning's suggestion to stay "approach-neutral" as far as possible. It'd be very nice for GRA if the protocol could be neutral in regards to sender/receiver orientation.

8.3 Kathleen Nichols

I realized in NSIS that there is something that I find very concerning about the "requirement" of fine-grained telephony type control in an "IP signaling protocol". It's one thing to say "how can we put voice services onto the Internet and what would that look like and what (minimally) would it take?" It's quite another to say "how can we make the Internet support all the traditional telco/telephony services?" I suspect the latter is quite hard while the former is quite interesting.

9.0 Acknowledgements

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10.0 Security Considerations

An important requirement for any next generation signaling protocol will be that its operation must be secure in the face of malicious attacks and attempts to disrupt, hijack or steal the services signaled by the protocol.

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