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**Requirements for Remote Participation Services for the IETF  
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**Abstract**

The IETF has provided some tools for remote participation in its activities for many years, and some IETF participants have also used their own tools when they felt the need arise. The IETF now wishes to support enhanced remote participation that is as seamless as possible, approaching the quality of direct physical attendance for the various roles, including chair, presenter and simple attendee. Before deploying the new tools and services needed for this enhanced remote participation, the requirements for such tools and services must be defined. This document is meant to be that definition.

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## Table of Contents

<a href="#">1.</a>	<a href="#">Introduction . . . . .</a>	<a href="#">4</a>
<a href="#">1.1.</a>	<a href="#">About This Document . . . . .</a>	<a href="#">5</a>
<a href="#">2.</a>	<a href="#">Scenarios Required to be Supported . . . . .</a>	<a href="#">7</a>
<a href="#">3.</a>	<a href="#">Interactions with Current RPS Tools Used by the IETF . . . . .</a>	<a href="#">8</a>
<a href="#">3.1.</a>	<a href="#">Technologies Currently Used at Regular IETF Meetings . . . . .</a>	<a href="#">8</a>
<a href="#">3.2.</a>	<a href="#">Locating the Meeting Information . . . . .</a>	<a href="#">9</a>
<a href="#">3.2.1.</a>	<a href="#">Audio . . . . .</a>	<a href="#">9</a>
<a href="#">3.2.2.</a>	<a href="#">Instant Messaging . . . . .</a>	<a href="#">10</a>
<a href="#">3.2.3.</a>	<a href="#">Slides . . . . .</a>	<a href="#">10</a>
<a href="#">3.3.</a>	<a href="#">Remote Participation at IETF Meetings . . . . .</a>	<a href="#">10</a>
<a href="#">3.3.1.</a>	<a href="#">Remotely Speaking at the Mic . . . . .</a>	<a href="#">10</a>
<a href="#">3.3.2.</a>	<a href="#">Remotely Presenting . . . . .</a>	<a href="#">13</a>
<a href="#">3.3.3.</a>	<a href="#">Floor Control . . . . .</a>	<a href="#">13</a>
<a href="#">3.4.</a>	<a href="#">Remote Participation at IETF Interim WG Meetings . . . . .</a>	<a href="#">14</a>
<a href="#">3.4.1.</a>	<a href="#">Face-to-Face Interim Meetings . . . . .</a>	<a href="#">14</a>
<a href="#">3.4.2.</a>	<a href="#">Virtual Interim Meetings . . . . .</a>	<a href="#">14</a>
<a href="#">4.</a>	<a href="#">Requirements for Supporting Remote Participation in Regular IETF Meetings . . . . .</a>	<a href="#">15</a>
<a href="#">4.1.</a>	<a href="#">Registration for Remote Participation . . . . .</a>	<a href="#">17</a>
<a href="#">4.2.</a>	<a href="#">Audio . . . . .</a>	<a href="#">18</a>
<a href="#">4.2.1.</a>	<a href="#">IM-to-Mic Relay of Comments from Remote Participants . . . . .</a>	<a href="#">18</a>
<a href="#">4.2.2.</a>	<a href="#">Audio from Remote Participants to the Room . . . . .</a>	<a href="#">19</a>
<a href="#">4.3.</a>	<a href="#">Video . . . . .</a>	<a href="#">21</a>
<a href="#">4.3.1.</a>	<a href="#">Video from the Room to Remote Participants . . . . .</a>	<a href="#">21</a>
<a href="#">4.3.2.</a>	<a href="#">Video from Remote Participants to the Room . . . . .</a>	<a href="#">22</a>
<a href="#">4.4.</a>	<a href="#">Instant Messaging . . . . .</a>	<a href="#">22</a>
<a href="#">4.5.</a>	<a href="#">Slide Presentations . . . . .</a>	<a href="#">23</a>
<a href="#">4.6.</a>	<a href="#">Slide Distribution . . . . .</a>	<a href="#">23</a>
<a href="#">4.7.</a>	<a href="#">Shared Document Editing . . . . .</a>	<a href="#">24</a>
<a href="#">4.8.</a>	<a href="#">Archiving . . . . .</a>	<a href="#">25</a>
<a href="#">4.9.</a>	<a href="#">Transcription . . . . .</a>	<a href="#">25</a>
<a href="#">4.10.</a>	<a href="#">Polling . . . . .</a>	<a href="#">25</a>
<a href="#">4.11.</a>	<a href="#">Plenaries . . . . .</a>	<a href="#">26</a>
<a href="#">4.12.</a>	<a href="#">Use by IETF Leadership . . . . .</a>	<a href="#">26</a>
<a href="#">4.13.</a>	<a href="#">Additional Requirements for Remote Participation . . . . .</a>	<a href="#">26</a>
<a href="#">5.</a>	<a href="#">Requirements for Supporting Remote Participation in Interim Meetings . . . . .</a>	<a href="#">27</a>
<a href="#">5.1.</a>	<a href="#">Requirements for Supporting Remote Participation in Face-to-Face Interim Meetings . . . . .</a>	<a href="#">28</a>
<a href="#">5.2.</a>	<a href="#">Requirements for Supporting All-Remote Interim Meetings . . . . .</a>	<a href="#">29</a>
<a href="#">6.</a>	<a href="#">IANA Considerations . . . . .</a>	<a href="#">29</a>
<a href="#">7.</a>	<a href="#">Security Considerations . . . . .</a>	<a href="#">29</a>
<a href="#">8.</a>	<a href="#">Acknowledgements . . . . .</a>	<a href="#">30</a>
<a href="#">9.</a>	<a href="#">Informative References . . . . .</a>	<a href="#">30</a>
	<a href="#">Author's Address . . . . .</a>	<a href="#">30</a>



## **1. Introduction**

There are two types of participants at the three-times-a-year IETF meetings: the people who are physically at the meeting ("local attendees") and people that are not physically at the meeting but are following the meeting online ("remote attendees"). For more than a decade, the IETF has tried to make it easier for remote attendees to participate in its face-to-face meetings in a meaningful fashion by providing supported and experimental online services.

At the same time, many IETF Working Groups (WGs) have started to have interim meetings that are scheduled between the regular IETF meetings; these are described (briefly) in [[RFC2418](#)]. Some of these interim meetings are face-to-face meetings with remote attendees, while other interim meetings only take place over the Internet or on the phone; the latter type of meeting is often called a "virtual interim". There are also interim meetings that do not support remote participation.

The IETF's current remote participation system ("RPS") for the official three-times-a-year meetings ("regular IETF meetings") consists of a real-time audio stream carried over HTTP, textual instant messaging (IM) carried over Jabber, as well as experimental support for two integrated tools, WebEx and Meetecho. Some WGs employ ad-hoc tools such as Skype. For interim WG meetings, the IETF provides access to WebEx. The IETF's leadership regularly uses telephone, Jabber, and WebEx for the many meetings that happen between the IETF meetings.

The IETF wants to improve the tools provided in the RPS for many reasons.

- o A better RPS would allow more people to participate in regular IETF meetings more effectively, hopefully leading to better WG outcomes such as faster progression of WG documents, more reviewers of WG documents, and more discussion of changes needed to those documents during the WG process. There are many people who are active in many WGs who rarely or never come to IETF meetings; good RPS tools could allow these people to contribute significantly during meetings like they do on the mailing lists.
- o The improved RPS tools would also be used outside IETF meetings. They would be available to WGs for interim meetings, both to allow remote participation in face-to-face interims as well as to facilitate "virtual interims" where none of the participants are in the same location.



- o The plenary sessions of IETF meetings currently only allow remote attendees to hear the speakers and read a real-time transcript. Improved RPS tools would allow remote attendees to see the speakers and be able to comment at the mics like people in the room.
- o The IETF leadership (the IAB, IESG, IAOC, and probably others) could use the new tools to help make their own meetings more effective.

### 1.1. About This Document

The purpose of this document is to develop the requirements and functional specifications for the IETF's RPS that enables enhanced remote participation in meeting sessions. The RPS described in this document might augment and/or replace the current set of IETF RPS tools. The intention is for the experience of remote attendees to rival those of local attendees.

After the tools that meet the requirements in this document are deployed, there will probably be a change in the participation in regular IETF meetings.

- o Some people who would make an effort to come to a particular IETF meeting might be more likely to attend remotely. Such a change will reduce the number of local attendees, which will both reduce the amount that the IETF makes from registration fees and makes the informal gatherings during the IETF meeting less valuable because of the reduced networking effects.
- o People who are active on WG mailing lists but not in the regular meetings are more likely to participate in the meetings remotely. Such a change might cause more effective meetings for WGs that are lagging in energy because more people will participate. WG meetings that already have lots of participants will probably become busier. Presentations on documents where none of the authors come to regular IETF meetings will be much more likely to be given by the authors instead of by their proxies.
- o If the tools make regular IETF meetings and interim meetings much more effective, the IETF might be able to reduce the number of regular meetings each year from three to two. This would significantly reduce the impact of travel on regular IETF participants and make meeting planning much easier, but could significantly change the finances for the IETF and also reduce the amount of side-meeting value per year for participants.

Note that some of the requirements in this document for particular





functionality may not be desired by all WG chairs. The tools proposed will not force a particular WG to use all the features proposed.

This document is being produced at the request of the IAOC. The request for proposals that led to this document can be found at [\[RPS-RFP\]](#). This document does not specify specific technologies or instantiations of tools. Instead, it is meant to be used as a guide for the IAOC to later contract the development and deployment of the tools described here.

Requirements in this document are numbered, such as "\*\*\*Requirement 02-00\*\*\*". In the IETF, there is an active (and never-ending) debate about what is a "requirement". In the context of this document, a requirement is something that must appear in one of the iterations of the eventual RPS in order to support the mission of enabling useful remote participation in meeting sessions.

Later versions of this document will differentiate between requirements that must be met by the first version of the RPS and requirements that must be met by future versions of the RPS. For example, a requirement for the first version of the RPS might be "chairs must be able to specify which remote attendee can speak next", whereas a requirement for a later version of the RPS might be "chairs must be able to perform many or all chair duties at a regular IETF meeting while participating remotely". [[[ TODO: come up with a way to differentiate these two and start marking them as such. ]]]

A functional specification is an approach to meeting one or more requirement. For example, a requirement might be "chairs must be able to specify which remote attendee can speak next" and a function's specification associated with that requirement might be "floor control can be done through a stand-alone application or web form". Functional specifications are not (currently) called out in this document.

The requirements covered in this document apply almost exclusively to tools and services that are used for remote participation in real-time meetings. The document does not cover the many other tools used by WGs for non-real-time communication such as mailing lists, issue trackers, document flow control systems, and so on. Many of the non-real-time tools are also being improved over time, but they are not the subject of this document.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [[RFC2119](#)].



This document is being discussed on the [vmeet@ietf.org](mailto:vmeet@ietf.org) mailing list. See <https://www.ietf.org/mailman/listinfo/vmeet> for more information.

## **2. Scenarios Required to be Supported**

There are many IETF-related activities that can be aided by remote participation tools. The scenarios in which the RPS described in this document is expected to be used are:

- o WG sessions at regular IETF meetings -- A typical regular IETF meeting has about 150 sessions, with up to 8 of those sessions happening at the same time. A session might have between 20 and 200 local attendees in the room, and might have only a few or many dozens of remote attendees. WG sessions typically have one to three co-chairs at the front of the room and a series of individuals who come to the front to present; some presentations are made by small panels.
- o Plenaries at regular IETF meetings -- There are usually two plenaries at a regular IETF meeting, with on-site attendance of about 700 local attendees and dozens of remote attendees. There are from 1 to 20 presenters; presentations may be made by multiple people.
- o Face-to-face interim WG meetings -- Between regular IETF meetings, some WGs hold interim meetings where participants get together at a site (often a company's meeting room, but sometimes a meeting room rented at a hotel). At such meetings, there are between a handful and a few dozen local attendees and a similar number of remote attendees. Presentations are common.
- o Virtual interim WG meetings -- Between regular IETF meetings, some WGs hold virtual interim meetings where there are no local attendees because there is no central meeting location. There are between a handful and a few dozen attendees. Presentations are common.
- o IETF leadership meetings -- The IETF leadership (the IESG, IAOC, IAB, and probably others) have periodic virtual meetings, usually with presentations. These groups also meet at the regular IETF meetings, and sometimes have remote attendees at those meetings (such as members who cannot attend the IETF meeting or presenters who are not part of the leadership group).

[[[ TODO: Count the number of f2f and virtual interims from the past few years. ]]]



### **3. Interactions with Current RPS Tools Used by the IETF**

Users' experience with the current IETF tools vary widely. Some participants think the tools are fine and are grateful that they exist. Other participants find them barely acceptable because they have used better tools in other environments. Often, local attendees mostly forget that the remote attendees are participating until one gets something said at the mic. Local attendees don't have a feeling for how many remote attendees are just listening like most of the local attendees.

The variety of current experiences can help inform the discussion of how to improve the tools. The requirements here are derived from the current tools; later sections derive requirements from needs that are not at all met by the current tools.

The IETF has years of experience with the two primary tools used at its regular meetings (Jabber for IM and streaming audio). This section discusses some of the reactions of users -- those in the meetings and those who have participated remotely -- to the current tools.

#### **3.1. Technologies Currently Used at Regular IETF Meetings**

There are three tools that are used by remote attendees for WG participation at regular IETF meetings: real-time audio, instant messaging, and slides.

For the past few years, the IETF has used audio streamed over HTTP over TCP. TCP is often buffered at many places between (and in) the origination in the IETF meeting venue and the users' computer. At recent meetings, delays of around 30 seconds have been recorded, with minimum delays typically being five seconds. This delay is caused by buffering at the hop-by-hop ISPs and in the remote attendee's computer. At recent IETF meetings, remote attendance is almost always less than 10% of local attendance, and is often less than 5%. (There are more remote attendees when the IETF meeting is in the U.S.) Each stream is represented by an MP3 playlist (sometimes called an "m3u file").

The IETF long ago standardized on Jabber / XMPP ([\[RFC6120\]](#), [\[RFC6121\]](#), and others) for instant messaging used within the IETF. Jabber rooms (formally called "multi-user conferences" or "MUCs") exist for every WG, and those rooms are live all the time, not just during regular IETF meetings. There are also stable Jabber rooms for the plenaries and certain other activities. BoFs are usually assigned Jabber rooms before a regular meeting.



Presentation slides normally are stored either as PDFs or in one of Microsoft's formats for PowerPoint. They are projected on a local screen from someone's laptop computer.

There has been experience at recent meetings with two tools, WebEx and Meetecho, which are supported experimentally by the IETF. Each tool was used by a handful of WGs with mixed success. The tools require remote attendees to use specific clients, and installation of those clients caused problems for some people. On the other hand, the tools have much more robust meeting control features, and participants appreciated the real-time showing of slides during presentations.

### **3.2. Locating the Meeting Information**

Finding information for the real-time audio, instant messaging, and slides for an upcoming or current regular meeting is complicated by that information being in many different locations on the IETF web site, and the fact that the relevant URLs can change before and even during the meeting. Further, a WG chair might copy the latest information and send it to the WG mailing list, but there can be later changes. Experienced remote attendees have gotten used to checking just before the meeting itself, but even that does not always guarantee the correct information.

Currently, the meeting information appears in two different agendas:

- o The official agenda on the IETF Datatracker includes links to venue maps, WG charters, agendas, and Internet-Drafts. For example, see [<https://datatracker.ietf.org/meeting/82/agenda.html>](https://datatracker.ietf.org/meeting/82/agenda.html).
- o The unofficial "tools-style agenda" includes the same links as the official agenda plus links to the presentations, audio, minutes, Jabber room, and Jabber logs (represented as small icons). For example, see [<http://tools.ietf.org/agenda/82/>](http://tools.ietf.org/agenda/82/).

#### **3.2.1. Audio**

The URL for the audio stream for a WG or BoF meeting is based on the room that the meeting is in. The audio streams are announced on the general IETF mailing list (ietf@ietf.org) before each meeting.

A common complaint is that when a WG meeting moves to a different room, remote users need to know about the move so that they can use the proper URL to hear the audio stream. The room changes are often, but not always, announced on WG mailing lists; when they are not announced, there is no easy way for a remote attendee to find out





which audio stream they should be listening to. Sometimes, room changes happen just as a WG meeting is starting, making it nearly impossible for a remote attendee to know about the change in streams.

### **3.2.2. Instant Messaging**

The Jabber rooms used by WGs and BoFs do not change between IETF meetings, so finding the right Jabber room is relatively easy. Some Jabber clients have odd interfaces for joining Jabber rooms, and this can cause some problems; even though participants can test their Jabber clients before a meeting, there still seems to be some who need help just before a WG meeting. There are sometimes problems with people joining Jabber rooms; in these cases, the participant needs to find someone already in the Jabber room to invite them to the discussion.

### **3.2.3. Slides**

Slides are available from the meeting materials page. Many, but certainly not all, local and remote attendees know how to find the meeting materials page.

It has become fairly common for presenters to not have their presentations available for distribution until just before the WG meeting. Because materials are uploaded by the WG chairs, this often causes the beginning of WG meetings to be a dance involving presenters giving the chairs their slides, followed by chairs uploading the slides to the IETF site, followed by the chairs saying "the slides are there now".

## **3.3. Remote Participation at IETF Meetings**

### **3.3.1. Remotely Speaking at the Mic**

In order for a remote attendee to speak at the mic, a local attendee must say it for them. In most WG and BoF meetings, this is done by the remote attendee typing into the Jabber room for the meeting, and some local attendee going to the mic and repeating what was typed into the Jabber room. Remote attendees often precede what they want said at the mic with the string "mic:" to differentiate that from the rest of the discussion in the Jabber room.

This method of participation often works adequately, but there are many places where it fails. The following is a compendium of stories from recent IETF meetings and interim face-to-face meetings where remotely speaking at the mic didn't work as well as it could have. The participants are Chris and Carl (WG co-chairs), Sam (volunteer Jabber scribe), Rachel and Robert (remote attendees), Pete



(presenter), and Len and Lee (local attendees).

- o Robert cannot understand what Pete is saying about slide 5, but Sam doesn't get Pete's attention until Pete is already on slide 7 and Pete doesn't want to go back.
- o Rachel wants to say something, but Sam's Jabber client has crashed and no one else in the Jabber room knows why Sam isn't going to the mic.
- o Robert wants to say something, but Sam is already at the mic speaking for Rachel so Sam doesn't see Robert's message until he has gotten out of the mic line.
- o Sam is speaking for Robert, and Rachel wants to comment on what Robert said. Unless Sam reads the message as he is walking back to his seat, Rachel doesn't get to speak.
- o Robert wants to say something at the mic, but Sam is having an important side discussion with the AD.
- o Sam is also the minutes taker, and is too busy at the moment catching up with the lively debate at the mic to relay a question from Rachel.
- o Chris thought Carl was watching the Jabber room, but Carl was reading the draft that is being discussed.
- o Chris and Carl start the meeting by asking for volunteers to take minutes and be Jabber scribe. They couldn't find a Jabber scribe, and it took a lot of begging to get someone to take minutes, so they figured that was the best they could do.
- o Sam is also a presenter, and Robert has a question about Sam's presentation, but Sam is obviously not looking at the Jabber room at the time.
- o Rachel asks a question through Sam, and Pete replies. Len, who is next in line at the mic, starts talking before Sam has a chance to see whether or not Rachel has a follow-up question.
- o Robert makes a point about one of Pete's slides, and Pete responds "I don't think you're looking at the right slide" and continues with his presentation. Robert cannot reply in a timely fashion due to the lag in the audio channel.
- o Pete starts his presentation by asking for questions to be held until the end. Robert has a question about slide 5, and is



waiting until the end of the presentation to post the question in the Jabber room. After slide 7, Len jumps to the mic and vehemently disagrees with something that Pete said. Then Lee gets up to respond to Len, and the three of them go at it for a while, with Lee getting up again after slide 10. The presentation ends and is over time, so Carl says "we need to move on", so Robert never gets to ask his question.

- o Chris asks "are there any more questions" while Rachel is typing furiously, but she doesn't finish before Chris says "I don't see anyone, thanks Pete, the next speaker is...".
- o Rachel comments on Pete's presentation though Sam. Sam doesn't understand what Rachel is asking, and Len goes to the mic to explain. However, Len gets his explanation of what Rachel said wrong and by the time Pete answers Len's interpretation, Rachel gives up.
- o This is the first time Pete is presenting at an IETF meeting, and Robert has the first question, which is relayed through Sam. Pete stays silent, not responding the question. Robert can't see Pete's face to know if Pete is just not understanding what he asked, is too afraid to answer, is just angry, or something else.
- o Pete says something incorrect in his presentation, and Len asks the folks in the Jabber room about it. Rachel figures out what Pete should have said, and others in the Jabber room agree. No one goes to the mic because Pete has left the topic, but only the people watching Jabber know that the presentation was wrong.
- o Pete says something that the AD sitting at the front of the room (not near a mic) doesn't like, and the AD says a few sentences but doesn't go to the mic. The chairs try to repeat what the AD says, get it only approximately right, but the remote attendees do not hear what really was said and therefore cannot comment effectively.
- o Sam only volunteered to be scribe because no one else would do it, and isn't sitting close to the mic, and gets tired of getting up and down all the time, and doesn't really agree with Robert on a particular issue, so Sam doesn't relay a request from Robert.
- o Rachel cannot join the Jabber room due to a client or server software issue. She finally finds someone else on Jabber who is also in the meeting, and gets them to invite her into the room.



### **3.3.2. Remotely Presenting**

Some WGs have experimented with remote presentations at regular IETF meetings, with quite mixed results. For some, it works fine: the remote presenter speaks, the chair moves the slides forward, and questions can be heard easily. For others, it is a mess: the local attendees can't hear the presenter very well, the presenter can't hear questions or there is a long delay, and it was not clear when the presenter was waiting for input or there was a lag in the sound.

At a recent meeting that had a remote presenter, a WG had a video camera set up at the chairs' desk pointed towards the audience so that the presenter could see who was at the mic; this was considered to be a great help and a lot friendlier because the presenter could address the people at the mic by name. They also had the presenter's head projected on the screen in the room, which led to a lot of jokes and discussion of whether seeing the remote presenter caused people to pay more attention.

Remote presenters have commented how difficult it is to set up their systems, particularly because they are not sure whether their setup is working until the moment they are supposed to be presenting. Even then, the first few minutes of the presentation has a feeling of "is this really working?".

[[[ TODO: More discussion about experiences with remote presenters. Include more discussion of where it went well. ]]]

### **3.3.3. Floor Control**

Although [Section 3.3.1](#) may seem like it is a bit harsh on WG chairs, the current tools do not give them the kind of control over remote attendees that they have over local attendees. The chairs can tell what is happening at the mics, but have much less view into what is happening on Jabber, even if they are watching the Jabber room. Without as much view, they cannot assist the flow of the conversation as well.

- o Carl sees that the Jabber room has an active and useful back-channel discussion during Pete's provocative presentation. Pete finishes and asks for questions. Lee and Len rush to the mic line, and it takes Robert a few seconds to get his question into the Jabber room and for Sam to go to the mic. Carl tries to prioritize Sam forward in the line, but Len gets upset when he does.
- o Rachel asks a question, but Sam is not going to the mic to relay it. In fact, Sam has pretty much stopped paying attention. Chris





cannot do something about the situation without making Sam look bad.

- o Pete has run over time, Robert asks what is supposed to be the last question, and Pete doesn't understand what Sam said. Carl cannot tell whether to wait for Robert to rephrase the question or whether Robert even heard Pete's response.
- o In a virtual interim where remote attendees all participate by voice, someone can be heard typing / eating / talking loudly to someone else. Carl and Chris try to get that person's attention over the audio and Jabber, but to no avail. The tool being used does not have the ability to mute individual participants, so the meeting is disrupted until that person finally realizes that he or she is not muted.

### **3.4. Remote Participation at IETF Interim WG Meetings**

#### **3.4.1. Face-to-Face Interim Meetings**

Many interim meetings are held face-to-face in conference rooms supplied by companies active in the IETF (and, much less often, in commercial conference facilities such as hotels). Because these facilities are not controlled by the IETF Secretariat, the ability to include remote attendees varies widely. Some facilities can distribute the in-room audio over the Internet just fine, while others have no or limited abilities to do so.

For example, a recent face-to-face interim meeting was supposed to be open to remote attendees through WebEx, but the sound coming from the room was too soft to hear reliably. Even if a face-to-face interim meeting has good facilities for audio and slide presenting, it will probably have similar to regular IETF meetings.

#### **3.4.2. Virtual Interim Meetings**

Because few WGs have virtual interim meetings (those with no face-to-face attendees), there is less experience with the tools that are commonly used for them. The IETF has had free use of WebEx for a few years, and some WGs have used different tools for audio participation. For example, some virtual interims are held using Skype, others with TeamSpeak, and so on.

So far, the experience with virtual interim meetings has been reasonably good, and some people say that it is better than for remote attendees at regular IETF meetings and face-to-face interims because everyone has the same problems with getting the group's attention. Also, there are no problems getting the in-room audio



into the RPS because all attendees are using their own computers for speaking to the group.

One of the often-debated aspects of virtual interim meetings is what time to have them in order to make them available to all participants. Such scheduling of virtual interim meetings is out of scope for this document. However, it is noted that because many participants will be attending at different times of day and night, no assumption can be made that participants will be at an "office". This debate also affects face-to-face interim meetings because the meeting hosts normally will schedule the meeting during business hours at the host company, but that might be terribly inconvenient for some WG members.

[[[ TODO: More discussion about experiences with virtual interims. Focus on differences between the all-in-one systems like WebEx and the cobble-together systems where there is an audio feed with no floor control plus pre-distributed slideware. ]]]

#### **4. Requirements for Supporting Remote Participation in Regular IETF Meetings**

This section covers the functional specification for effective remote participation in meetings where some members are in regular IETF face-to-face meetings. Some of the requirements in this section overlap with those in [Section 5](#), but many are unique to meetings that have a large number of attendees physically present.

There is an assumption in this section that the meeting chairs will continue to control the flow of the discussion. That is, if a presenter is speaking and a remote attendee wants to ask a question, the request to do so goes to the chair, not to the presenter. This is covered in more detail in [Section 4.2.2.1](#).

**\*\*Requirement 02-01\*\*:** The specifications SHOULD rely upon IETF and other open standards for all communications and interactions wherever possible.

**\*\*Requirement 02-02\*\*:** All tools in the RPS SHOULD be able to be run on the widest possible array of computers. The tool may be a stand-alone application, from any modern web browser, or from the command line, but needs to be available on all of (at least) MacOS version 10.6 or later, Windows 7 or later, and any common Linux distribution produced in 2010 or later. This also means that the tools MUST NOT rely on Adobe Flash to work correctly. [[[ TODO: Do we need to include IOS and Android platforms in that list? ]]]



**\*\*Requirement 02-03\*\***: Audio, video, instant messaging, and slide streams going to and from remote attendees SHOULD be delivered in as close to real-time as is practically possible. A common complaint with the current RPS is that the streaming audio can take more than 10 seconds (and sometimes as much as 30 seconds) to reach the remote attendee. This causes many of the problems listed in [Section 3.3.1](#).

[[[ TODO: Proposed replacement for this requirement is "Delays MUST be less than X milliseconds greater than the network delay to the remote attendee." Two values for X have been proposed: 200 and 500. ]]]

[[[ TODO: A possibly different way to set the requirement is "The audio MUST achieve a MOS (Mean Opinion Score) of 3.5 or better." And there should probably be a discussion of a possible equivalent for video. A proposal was "320x240 @ 15fps". ]]]

**\*\*Requirement 02-04\*\***: The outgoing audio, video, and slide streams MUST have the same delays so the remote participant does not get confused during slide presentations.

**\*\*Requirement 02-05\*\***: All streaming information from the RPS MUST be usable over slow Internet connections. Many remote attendees will be in places with limited bandwidth. [[[ TODO: We need to define "slow" here, or drop the requirement. ]]]

**\*\*Requirement 02-06\*\***: All proposed tools MUST detail the bandwidth required for each participant for various levels of participation (audio-only, audio and video, and so on).

[[[ TODO: Is there a requirement for PSTN for audio-only? ]]]

**\*\*Requirement 02-07\*\***: Audible echo in the audio stream MUST be damped and/or eliminated by the tools. [[[ TODO: Proposed replacement: the RPS MUST recognize audible echo and automatically take measures to reduce it to a level which won't distract listeners. ]]]

**\*\*Requirement 02-08\*\***: WG chairs MUST be able to test whether or not the tools for their session are working at least 30 minutes before the meeting begins (unless, of course, there is already another meeting occurring in the room during that time).

**\*\*Requirement 02-09\*\***: There MUST be written operational documentation for each RPS tool that is accessible at all times. This will help reduce problems where a WG chair is having problems during a meeting that is affecting the meeting as a whole.



**\*\*Requirement 02-10\*\*:** There SHOULD be training materials for WG chairs in how to use the RPS tools.

#### **4.1. Registration for Remote Participation**

There has been periodic discussion of whether or not remote attendees are bound by the "Note Well" text that local attendees are bound to. The core question is which local and remote attendees are "contributors" based on the definitions in [\[BCP78\]](#). By requiring registration before participating, remote attendees can be better alerted to, and thus hopefully bound to, the requirements of contributors.

The cost for remote attendees to register, if any, is not covered in this document but will instead be determined by the IETF at a later time. There are many ideas on the subject (tiered costs for different services, no cost at all for the first year, and others), but the effects of different cost structures is beyond the scope of this document.

**\*\*Requirement 02-11\*\*:** All remote attendees MUST register with the IETF Secretariat before using any of the RPS tools described here. Note that this would be a significant change to the current RPS tools in that an unregistered person would not be able to use the IM system. [[[ TODO: Should this be split into "unregistered people can listen and read, but not contribute"? ]]]

**\*\*Requirement 02-12\*\*:** The RPS MUST have a system where a remote attendee can register their name and have that name be used in the instant messaging and video systems. Registration must only need to be done once for an entire regular IETF meeting.

**\*\*Requirement 02-13\*\*:** A remote attendee may register a nickname that will be shown to other attendees during the meeting. A remote attendee must register with a "verified" name with the IETF Secretariat. The nickname will appear in video and instant messaging. [[[TODO: Is this anonymity appropriate in light of the "note well" and floor control requirements? ]]]

**\*\*Requirement 02-14\*\*:** The RPS tools (particularly the registration tool) MUST gracefully handle multiple attendees who have the same name.

**\*\*Requirement 02-15\*\*:** To support the "blue sheet" functionality for remote attendees, the registration tool SHOULD allow a registered user to indicate which sessions he or she attended. This notations SHOULD be allowed for all WG meetings throughout the meeting period. The registration system SHOULD remind all registered remote attendees





at the end of the week to update their notations.

## **4.2. Audio**

Audio from face-to-face meetings travels in two directions: from the room to remote attendees, and from remote attendees to the room.

A few requirements come from the IETF's current use of audio in meetings. Meeting rooms have many mics: one or two for the chairs, one for the presenter, and at least one for other local attendees to ask questions. Plenaries have many more mics, both at the front of the room and in the audience.

**\*\*Requirement 02-16\*\***: Remote attendees MUST be able to hear what is said by local attendees and chairs at any mic in the meeting.

Comments on early drafts of this document indicated that the latter may not really be a requirement for all participants if IM-to-mic is made predictable. The two options are split below to make the discussion clearer. Note that even if the consensus is towards IM-to-mic, remote-to-room might still be required to enable remote presenters; in this case, there would probably be little need for floor control. The requirements for audio are expected to be important discussion points in future versions of this document.

[[[ TODO: Should the ability to dial into a meeting stream via POTS be a requirement? ]]]

### **4.2.1. IM-to-Mic Relay of Comments from Remote Participants**

As described in [Section 3.3.1](#), the current tools support an informal method for remote attendees to speak at the mic: in the Jabber room, they enter "mic:" before their comment and hope that the designated scribe or someone else goes to the mic to relay the comment. This method works, but has significant flaws described in that section.

**\*\*Requirement 02-17\*\***: Relay of messages from IM to the mic MUST happen as quickly as if the remote attendee was local.

**\*\*Requirement 02-18\*\***: The person relaying from IM to the mic must be available throughout the WG meeting. This could be facilitated by hiring people to attend meetings for the specific purpose of being IM-to-mic scribes.

**\*\*Requirement 02-19\*\***: If multiple remote attendees want to comment at the same time, the person relaying from IM to the mic MUST be able to relay for all of them.



Note: during the development of this document, there have been many suggestions for how WG chairs can better manage the IM-to-mic relaying (for example, with planned pauses, better tracking of the IM room, and so on). Some of those suggestions might turn into requirements to be included in this document, but so far most of them seem to be really about improving WG chairs, not the RPS tools.

#### **4.2.2. Audio from Remote Participants to the Room**

Note that the requirements here assume a very large change in the way that remote participation will happen. Instead of a remote attendee typing something into the Jabber room that someone will repeat at a mic in the room, remote attendees will use their own mics to speak to the meeting.

**\*\*Requirement 02-20\*\*:** Remote attendees **MUST** be able to speak directly to a meeting without going through a local attendee, and have their speaking be heard by local attendees. (Note that the ability to speak is controlled by the chair; see [Section 4.2.2.1.](#))

**\*\*Requirement 02-21\*\*:** Local attendees **MUST** be able to determine which remote attendee is speaking. If the remote attendee is using a nickname (see Requirement 02-13), that nickname can be used by the remote speaker.

**\*\*Requirement 02-22\*\*:** The floor control portion of the RPS **MUST** give a remote attendee who is allowed to speak a clear signal when they should and should not speak.

**\*\*Requirement 02-23\*\*:** The audio system used by the RPS **MUST** be able to integrate with systems commonly used in the venues used for IETF meetings. IETF meetings happen in venues such as hotels and conference centers, most of which have their own audio setups. The IETF Secretariat contracts with those venues for the use of some or all of their audio system. Without such integration, audio from remote attendees might not be reliably heard by local participants.

**\*\*Requirement 02-24\*\*:** When a remote attendee connects to the audio stream to the room, their mic **SHOULD** start off muted. This will prevent problems such as those common with WebEx where a remote attendee doesn't realize that they can be heard.

**\*\*Requirement 02-25\*\*:** Remote participants **MUST** be able to unmute themselves; unmuting **MUST NOT** require interaction from the chair.



#### **4.2.2.1. Floor Control for Chairs for Audio from Remote Attendees**

Newcomers to regular IETF meetings often expect the floor control in WG meetings to be fairly straight-forward. By Tuesday, they might be shaking their heads, wondering why some people cut into the mic lines, why some people get up to the mics after the chair has closed the line, why some people ignore presenters' requests to hold questions to the end, and so on. Mixing remote attendees into this social structure will be a daunting task, but one that has been dealt with in many remote participation systems.

It is not yet clear how the set of remote attendees would be treated for queueing. Some tools have each remote attendee being considered separately, while others pool all remote attendees into one group. This affects the chair knowing and being able to act on the order that remote attendees ask to speak.

Note that, if the remote video to room requirements from [Section 4.3.2](#) need to be met, it is very likely that a related requirement to those below is that "the audio and video floor controls must be in the same tool".

**\*\*Requirement 02-26\*\***: Remote attendees MUST have an easy and standardized way of requesting the attention of the chair when the remote attendee wants to speak. The remote attendee MUST also be able to easily cancel an attention request. (Note that Requirement 02-69 implies that someone is watching the request queue, something that does not happen consistently with the current tools.)

A remote attendee might want to indicate that they are asking a question of the presenter, or answering a question that someone else asked at the mic, or want to bring up a new topic. **\*\*Requirement 02-27\*\***: The RPS MUST allow a remote attendee's request for attention to include an optional short text string.

**\*\*Requirement 02-28\*\***: Remote attendee's requests MUST be part of the floor control tool, not in the instant messaging system.

**\*\*Requirement 02-29\*\***: The chair MUST be able to see all requests from remote attendees to speak at any time during the entire meeting (not just during presentations) in the floor control system.

**\*\*Requirement 02-30\*\***: The floor control system MUST allow a chair to easily turn off and on an individual's ability to speak over the audio at any time.

**\*\*Requirement 02-31\*\***: The floor control system MUST allow a chair to easily mute all remote attendees.



**\*\*Requirement 02-32\*\*:** The floor control system **MUST** allow a chair to easily allow all remote attendees to speak without requesting permission; that is, the chair **MUST** be able to easily turn on all remote attendees mics at once.

It is common for a chair to leave the room, to have a side discussion with an AD, or to become a presenter. They should be able to do so without having to do a handoff of the floor control capability.

**\*\*Requirement 02-33\*\*:** The floor control system for the chair **MUST** be able to be run by at least two users at the same time.

**\*\*Requirement 02-34\*\*:** The RPS **MUST** authenticate users who can use the floor control system in a particular meeting using simple passwords.

**\*\*Requirement 02-35\*\*:** The IETF Secretariat **MUST** be able to easily set up the individuals allowed to use the floor control system for a particular meeting and to change the settings at any time, including during the meeting. [[[ TODO: Should those who are given floor control be allowed to augment that list to meet changing needs without going back to the Secretariat? ]]]

[[[ TODO: Is it possible to tell if a remote attendee who is speaking loses network connectivity? If so, maybe this can be shown to the chair. ]]]

**\*\*Requirement 02-36\*\*:** The chair **SHOULD** be able to monitor the sound levels of the audio being delivered to remote attendees to be sure that they can hear what is going on in the room.

### **4.3. Video**

The RFP that preceded the current document, [[RPS-RFP](#)], discusses video as a requirement. The IETF has experimented with one-way and two-way video at some meetings in the past few years. Remote attendees have said that seeing people in the meetings gave them a better understanding of the meeting; at a recent meeting, a remote presenter was able to see the people in line at the mic and was better able to interact with them. [[[ TODO: determine how much of this is needed for effective participation. ]]]

#### **4.3.1. Video from the Room to Remote Participants**

**\*\*Requirement 02-37\*\*:** Remote attendees **MUST** be able to see the presenter at a meeting.

**\*\*Requirement 02-38\*\*:** Remote attendees **MUST** be able to see local attendees at any mic in the meeting.





[[[ TODO: Is there a requirement that IETF video integrate with the venue video, if any? ]]]

#### **4.3.2. Video from Remote Participants to the Room**

Note that the requirements in this section probably only apply if there is consensus that audio from remote participants to the room is required. If so, there will probably also be requirements for video floor control as well.

**\*\*Requirement 02-39\*\***: The RPS MUST have the capability of showing video of the remote attendee who is speaking over the audio to the local attendees.

**\*\*Requirement 02-40\*\***: A remote attendee who is speaking MUST be able to choose what is shown to local attendees: video of them speaking, a still picture of their face, or just their name.

**\*\*Requirement 02-41\*\***: The RPS MUST give a remote attendee a clear indication when their video image is being shown to the local attendees.

[[[ TODO: The way to fulfill these might be that the IETF provide a laptop for the chair that has the right tools on it, and that laptop is the one connected to the projector. ]]]

#### **4.4. Instant Messaging**

Instant messaging (IM) is used both as a remote participation tool and as a communication tool for local attendees at a regular meeting. As noted earlier, while the current tool's Jabber room is a good way to get questions to the mic, it also becomes a second communications channel that only a few people in the room are participating in. This document does not address how to prevent that problem (or whether it really is much of a problem). The instant messaging system is also useful for remote users to ask about the status of the room ("is anyone there?").

**\*\*Requirement 02-42\*\***: The IM system MUST allow anyone to see all messages in the WG's or BoF's room. **\*\*Requirement 02-43\*\***: The IM system MUST allow any registered user (even those registered to use anonymous names) to post messages in the WG's or BoF's room.

Someone coming into a meeting late requires context for which messages in an instant messaging room are recent and which are old.

**\*\*Requirement 02-44\*\***: The date and time that a message appears in an IM stream MUST be retained. IM clients MUST be able to show an indication of the date and time for all messages.



[[[ TODO: Should there be multiple rooms for a meeting? There were many requests for a separate "speak into the mic" room, but that is not needed if the requirements in [Section 4.2.2](#) are met. Is there a need for other rooms? ]]]

[[[ TODO: Should non-registered people be allowed to read the IM traffic in real time, given that anyone can register anonymously? Should people registered anonymously be allowed to post in IM rooms? Should non-registered attendees be able to post to the IM rooms? ]]]

#### **[4.5.](#) Slide Presentations**

Slides are presented in regular IETF meetings with projectors on a screen at the front of the room from the video output of one or more local attendees' computers. If slides are to be presented to remote attendees, the slides being projected need to also be sent as a stream to the remote attendees.

In many current remote participation systems, slide presentations and the video coming from in-meeting cameras are sent as two separate streams (called the "slide stream" and the "camera stream"). The slide stream is usually much lower bandwidth than the camera stream, so remote attendees with limited bandwidth can choose to watch just the slides but not the local attendees. Further, separating the streams allows remote attendees to see the slide stream and the camera streams in separate windows that can be independently sized.

**\*\*Requirement 02-45\*\*:** The RPS MUST transmit the slide stream separately from the camera stream. **\*\*Requirement 02-46\*\*:** The slide stream MUST represent the slides as they are projected in the room, allowing the presenter to go back and forth, as well as to edit slides in real time.

**\*\*Requirement 02-47\*\*:** It MUST be made clear to the remote attendees which set of slides, and which slide number, is being currently shown.

[[[ TODO: If the slides will be visible to remote attendees as they are presented, is there a requirement that presenters be able to use the equivalent of a laser pointer? ]]]

#### **[4.6.](#) Slide Distribution**

Slides are available to local and remote attendees on the IETF servers before and during regular IETF meetings. This service is useful to all attendees who want to be prepared for WG meetings. The slides are not only used by remote attendees listening to the WG meeting; it is common for local attendees to download the slides and



view them on their laptops during meetings instead of having to read them at the front of the room.

**\*\*Requirement 02-48\*\*:** The RPS MUST be able to handle both PDF and PowerPoint formats (".ppt" and ".pptx") for distributed slides. [[[ TODO: Is there a requirement to support other formats? ]]] [[[ TODO: For the distributed slides, is there a requirement that animation in PowerPoint be supported, or just static slides? ]]]

**\*\*Requirement 02-49\*\*:** The RPS MUST automatically convert PowerPoint presentations to PDF and make both available for distribution at the same time.

**\*\*Requirement 02-50\*\*:** Presenters MUST be able to update their slides on the IETF site up to just before their presentation, if such update is allowed by the chairs.

**\*\*Requirement 02-51\*\*:** Chairs MUST be able to approve or disapprove of any slide submission or updates, with the default being that all submissions are allowed.

#### **4.7. Shared Document Editing**

In some WG meetings, there is an attempt to edit a document with input from the local attendees. This is typically done for proposed charter changes, but sometimes happens on a WG document or the meeting's agenda. This is usually unsuccessful, given the amount of text and the size of what can be displayed on the screen. In recent meetings, shared document editing has been used for editing charters and for taking minutes of meetings.

An RPS tool for shared document editing would be equally useful for local and remote attendees watching the edits happen in real-time. There is a good chance that this tool would be watched by local attendees on their laptops instead of being projected on the screen because of the small size of the the text. This, in turn, means that local attendees who aren't using their laptops at the moment would not be able to participate by watching.

**\*\*Requirement 02-52\*\*:** It MUST be easy to start a new shared document and to import existing text into a shared document.

**\*\*Requirement 02-53\*\*:** Shared real-time editing of text-only documents MUST be supported. This system must allow at least three people to have write access and hundreds of people to have read access to any particular document.

**\*\*Requirement 02-54\*\*:** Remote attendees MUST be able to be either the



writers or the readers of shared documents.

**\*\*Requirement 02-55\*\*:** Those with read access **MUST** be able to see the edits made by those with write access within less than five seconds after each edit.

**\*\*Requirement 02-56\*\*:** It **MUST** be easy to change the permissions for who gets write access to a document during an editing session.

[[[ TODO: Is this also needed for non-text documents? If so, in what formats? For example, is drawing on a whiteboard needed? ]]]

#### **4.8. Archiving**

Archived recordings of the events of the meetings are valuable for remote attendees who are not able to hear everything in real time.

**\*\*Requirement 02-57\*\*:** The RPS **MUST** support storage and distribution of recordings of the audio, video, and slide presentations for all sessions after IETF meetings. **\*\*Requirement 02-58\*\*:** Transcripts of the instant messaging for all meetings **MUST** be kept for distribution after IETF meetings. **\*\*Requirement 02-59\*\*:** The recordings and transcripts **SHOULD** be made available during the meetings, within a day of them being made.

**\*\*Requirement 02-60\*\*:** Users **MUST** be able to easily find the archives of the recordings and instant messaging transcripts of a particular WG or BoF session at a particular meeting.

**\*\*Requirement 02-61\*\*:** The RPS **SHOULD** support indexing of archived audio and video for particular events in meetings such as when speakers change.

**\*\*Requirement 02-62\*\*:** The RPS **MUST** support recording and storage of recordings of the audio, video, and slide presentations of interim meetings as well as regular IETF meetings.

#### **4.9. Transcription**

**\*\*Requirement 02-63\*\*:** Transmitting real-time transcription to remote attendees **MUST** be supported. The lag in transmission **MUST** be less than five seconds.

#### **4.10. Polling**

The common IETF method of assessing support is a straw poll, sometimes managed by audible humming, sometimes by raising hands.





**\*\*Requirement 02-64\*\***: A system for polling meeting participants, including remote attendees at the same time, **MUST** be provided. It **MUST** be easy to set up a simple poll, and it must be easy for all participants to find the poll and participate. Note that this would add a requirement that everyone in a meeting be using their computer to participate in the poll. [[[ TODO: Should the RPS also provide a tool that allows yes / no / abstain indications, which comes a lot closer to "voting" than currently is common? ]]]

#### **4.11. Plenaries**

At recent IETF meetings, there has been very little input from remote attendees even when there is a lot in the room, but that may be due to the current setup, not lack of interest.

**\*\*Requirement 02-65\*\***: Remote attendees **SHOULD** be able to make comments at the mic approximately as well as if they were local attendees. This means that either remote audio to the plenary room speakers be available, or that IM-to-room relay be available.

[[[ TODO: Are there other requirements that are special to plenaries that are not covered above? Are there requirements not listed above that mostly come from plenaries that would also apply to very large WGs? ]]]

#### **4.12. Use by IETF Leadership**

The requirements for bodies like the IESG and IAB to use the RPS during regular IETF meetings are similar to those of most WGs. The main difference is that they need a way to limit who can participate remotely.

**\*\*Requirement 02-66\*\***: The IETF Secretariat **MUST** be able to easily limit remote access to meetings on a room-by-room basis.

**\*\*Requirement 02-67\*\***: The IETF Secretariat must be able to limit participants in restricted meetings using a simple authentication mechanism.

Note that the IETF leadership will also heavily use the remote participation tools between IETF meetings in a manner that is very similar to virtual interim meetings.

#### **4.13. Additional Requirements for Remote Participation**

**\*\*Requirement 02-68\*\***: Remote attendees **MUST** be able to easily find all the material they need to effectively participate, including links to audio, video, instant messaging, slides, and so on. This



material **MUST** be available well before the time of the meeting. The page with the meeting material **SHOULD** allow the remote attendee to easily perform a time conversion to and from the local time at the IETF meeting.

**\*\*Requirement 02-69\*\***: A remote attendee who comes to a meeting late **MUST** be able to tell what is happening in the meeting. In specific, there **MUST** be an indication if the meeting has not started, if the meeting is happening (even if there is silence on the mics), and if the meeting is over.

Remote attendees need to be able to test the remote participation setup before a regular meeting, and even during the meeting.

**\*\*Requirement 02-70\*\***: There **MUST** be a constantly-running testing service that covers all interactive tools (audio, video, slide display, and so on) for at least a week before the meeting begins.

**\*\*Requirement 02-71\*\***: The testing service **MUST** run throughout the meeting so that last-minute joiners can test their systems.

**\*\*Requirement 02-72\*\***: The testing service **SHOULD** allow remote attendees to also test whether their outgoing audio, video, and slide control works.

**\*\*Requirement 02-73\*\***: Remote attendees **SHOULD** be able to easily contact the IETF Secretariat if they find problems with any of the RPS tools, and to get fairly rapid response.

**\*\*Requirement 02-74\*\***: Similarly, local attendees **SHOULD** be able to easily contact the IETF Secretariat if there are RPS problems in the meeting rooms.

**\*\*Requirement 02-75\*\***: The RPS tools **MUST** be available for AD-sponsored lunch meetings scheduled by the IETF Secretariat. Regular IETF meetings are more than just a group of WG meetings. Remote attendees may want to participate in the other parts of a regular meeting as well.

**\*\*Requirement 02-76\*\***: Any tools that are used by remote attendees **MUST** also be available to local attendees as well. At many IETF meetings, some local attendees act as remote attendees in WG meetings that they are not sitting in, so they can attend two WGs at once.

## **5. Requirements for Supporting Remote Participation in Interim Meetings**

One of the goals of this document is to increase the effectiveness of interim meetings. Interim meetings are now uncommon, but might become more common (and more effective) if the remote participation becomes more useful.



**\*\*Requirement 02-77\*\*:** The RPS SHOULD have a central location where the specifics about how remote participation is supported for every WG interim meeting. This will reduce the problems often seen where messages about how to participate in an interim meeting get buried in the WG mailing list.

**\*\*Requirement 02-78\*\*:** There SHOULD be documentation and training for the RPS tools specifically targeted at WG chairs who will lead interim meetings.

[[[ TODO: Determine how much or how little the IETF Secretariat should participate in setting up the RPS for interim meetings. The IETF Secretariat currently offers some help to some WGs, but this might become more formalized in the future. ]]]

### **5.1. Requirements for Supporting Remote Participation in Face-to-Face Interim Meetings**

Face-to-face interim meetings have many things in common with regular IETF meetings, but there are also many significant differences. For most WGs, fewer people attend interim meetings than IETF meetings, although those who travel to a face-to-face interim meeting are often the more active WG participants. There may be a larger demand for remote participation because people have a harder time justifying travel for a single WG meeting than for an IETF meeting, but there may also be less demand because people tend to think of interim WG meetings as less important than regular IETF meetings..

Typically, the IETF Secretariat does not control the rooms in which face-to-face interims are held, so they have no control over whether outgoing audio will be supported, or supported well enough to guarantee that remote attendees can hear. [[[ TODO: Should the IETF Secretariat be tasked with helping set up face-to-face interims? ]]]

**\*\*Requirement 02-79\*\*:** The RPS tools MUST be at least partially usable at face-to-face meetings other than regular IETF meetings. The number of the tools that might be available will be different for different venues for the virtual interims, but at a minimum, the following MUST be supported for remote attendees:

- o Room audio
- o Instant messaging
- o Slide distribution
- o Slide presentation



- o Shared document editing

[[[ TODO: What are the requirements for registering? Interim meetings are generally considered to have a very different feeling than regular IETF meetings; does this affect the idea of registration? What if registration is cheap but not free? ]]]

## **5.2. Requirements for Supporting All-Remote Interim Meetings**

The requirements for meetings that are all remote (that is, with no local attendees) are mostly a subset of the requirements for remote participation in a regular IETF meetings and face-to-face interim meeting. This section highlights the differences from [Section 4](#) and [Section 5.1](#).

Video for all-remote meetings may be more important than for face-to-face meetings in order to help the chair with floor control. [[[ TODO: Determine if this is true and, if so, the additional requirements for all the remote attendees. ]]]

Attendance at virtual interim meetings is supposed to be taken, but this is sometimes ignored. A system that is probably at least somewhat different than that in [Section 4.13](#) may be needed for collecting attendance at virtual interim meetings. [[[ TODO: What are the requirements for registering? Virtual interim meetings are generally considered to have a very different feeling than regular IETF meetings; does this affect the idea of registration? ]]]

[[[ TODO: Are there different floor control issues for all-remote meetings? ]]]

## **6. IANA Considerations**

None. [[ ...and thus this section can be removed before publication as an RFC... ]]

## **7. Security Considerations**

People who participate remotely in face-to-face IETF meetings might expect the same level of privacy as they have when they participate directly in those meetings. Some of the proposed tools might cause it to be easier to know which WGs a remote attendee was following. When RPS tools are deployed, the IETF should describe the privacy implications of using such a tool to the users so they can decide whether or not to use the tools.





The eventual RPS tools will have some user authentication that will associate people with actions. For example, a remote user might need to authenticate to the system in order to give a presentation or speak during a session. The credentials needed for this authentication will need to be managed in a secure fashion, both by the system and by the people who are being identified.

## **8. Acknowledgements**

Many of the ideas in this document were contributed by members of the IETF community based on their experiences during recent IETF meetings. There are also many contributions from people on the [vmeeet@ietf.org](mailto:vmeeet@ietf.org) mailing list as well as WG chairs.

Some of the text in this document originated in the request for proposals that was issued by the IAOC that led to this document.

## **9. Informative References**

- [BCP78] Bradner, S. and J. Contreras, "Rights Contributors Provide to the IETF Trust", [BCP 78](#), [RFC 5378](#), November 2008.
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