

On Consensus and Humming in the IETF

Abstract

The IETF has had a long tradition of doing its technical work through a consensus process, taking into account the different views among IETF participants and coming to (at least rough) consensus on technical matters. In particular, the IETF is supposed not to be run by a "majority rule" philosophy. This is why we engage in rituals like "humming" instead of voting. However, more and more of our actions are now indistinguishable from voting, and quite often we are letting the majority win the day without consideration of minority concerns. This document explains some features of rough consensus, what is not rough consensus, how we have gotten away from it, how we might think about it differently, and the things we can do in order to really achieve rough consensus.

Note: This document is quite consciously being put forward as Informational. It does not propose to change any IETF processes and is therefore not a BCP. It is simply a collection of principles, hopefully around which the IETF can come to (at least rough) consensus.

Status of This Memo

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1. Introduction

Almost every IETF participant knows the aphorism from Dave Clark's 1992 plenary presentation [Clark] regarding how we make decisions in the IETF:

We reject: kings, presidents and voting.

We believe in: rough consensus and running code.

That is, our credo is that we don't let a single individual dictate decisions (a king or president), nor should decisions be made by a vote, nor do we want decisions to be made in a vacuum without practical experience. Instead, we strive to make our decisions by the consent of all participants, though allowing for some dissent (rough consensus), and to have the actual products of engineering (running code) trump theoretical designs.

Having full consensus, or unanimity, would be ideal, but we don't require it: Requiring full consensus allows a single intransigent person who simply keeps saying "No!" to stop the process cold. We only require rough consensus: If the chair of a working group determines that a technical issue brought forward by an objector has been truly considered by the working group, and the working group has made an informed decision that the objection has been answered or is not enough of a technical problem to prevent moving forward, the chair can declare that there is rough consensus to go forward, the objection notwithstanding.

To reinforce that we do not vote, we have also adopted the tradition of "humming": When, for example, we have face-to-face meetings and the chair of the working group wants to get a "sense of the room", instead of a show of hands, sometimes the chair will ask for each side to hum on a particular question, either "for" or "against".

However, in recent years we have seen participants (and even some folks in IETF leadership) who do not understand some of the subtleties of consensus-based decision making. Participants ask, "Why don't we just vote? Why are we bothering with this 'humming' thing?" Or even more concerning, "We've already hummed/voted, so why isn't the discussion concluded?" Chairs, many of whom have little experience in leading large volunteer groups like those in the IETF, let alone experience in how to gather consensus, are faced with factious working groups with polarized viewpoints and long-running unresolved issues that return again and again to the agenda. More and more frequently, people walk away from working groups, thinking that "consensus" has created a document with horrible compromises to satisfy everyone's pet peeve instead of doing "the right thing".

None of these things are indicators of a rough consensus process being used, and the fact that we are seeing them is likely due to some basic misperceptions.

This document explains some features of rough consensus, explains what is not rough consensus, discusses some new ways to think about rough consensus, and suggests ways that we might achieve rough consensus and judge it in the IETF. Though this document describes some behaviors of working groups and chairs, it does so in broad brushstrokes and it does not prescribe specific procedures. Rather, this document is intended to foster understanding of the underlying principles of IETF consensus processes. While it may be of general interest to anyone interested in the IETF consensus processes, the primary audience for this document is those who have experience working in the IETF and are trying to understand and participate in the consensus-building process, and it is particularly aimed at generating thought and discussion among those who might lead a consensus discussion. Although most of the examples in this document talk about working group chairs, these principles apply to any person who is trying to lead a group to rough consensus, whether a chair, a design team leader, a document editor, an area director, or any community member who is facilitating a discussion or trying to assess consensus.

While the community has come to rough consensus that the principles expressed in this document are (at least approximately) right, many of our current practices are not consistent with these principles. Again, this document is primarily intended to generate thought and discussion, not dictate practices. If the IETF does commit itself to these principles, practices may change in the future.

2. Lack of disagreement is more important than agreement

A working group comes to a technical question of whether to use format A or format B for a particular data structure. The chair notices that a number of experienced people think format A is a good choice. The chair asks on the mailing list, "Is everyone OK with format A?" Inevitably, a number of people object to format A for one or another technical reason. The chair then says, "It sounds like we don't have consensus to use format A. Is everyone OK with format B?" This time even more people object to format B, on different technical grounds. The chair, not having agreement on either format A or format B, is left perplexed, thinking the working group has deadlocked.

The problem that the chair got themselves into was thinking that what they were searching for was agreement. "After all", thinks the chair, "consensus is a matter of getting everyone to agree, so asking

whether everyone agrees is what the chair ought to do. And if lots of people disagree, there's no consensus." But determining consensus and coming to consensus are different things than having consensus.

The distinction might be a bit subtle, but it's important. Engineering always involves a set of tradeoffs. It is almost certain that any time engineering choices need to be made, there will be options that appeal to some people, but are not appealing to some others. In determining consensus, the key is to separate those choices that are simply unappealing from those that are truly problematic. If at the end of the discussion some people have not gotten the choice that they prefer, but they have become convinced that the chosen solution is acceptable, albeit less appealing, they have still come to consensus. Consensus doesn't require that everyone is happy and agrees that the chosen solution is the best one. Consensus is when everyone is sufficiently satisfied with the chosen solution, such that they no longer have specific objections to it.

So, in the case of a working group decision, after the initial discussion of the pros and cons of the available choices, it is most important to ask not just for objections to a particular proposal, but for the nature of those objections. A chair who asks, "Is everyone OK with choice A?" is going to get objections. But a chair who asks, "Can anyone not live with choice A?" is more likely to only hear from folks who think that choice A is impossible to engineer given some constraints. Following up with, "What are the reasons you object to choice A?" is also essential. Then, the purported failings of the choice can be examined by the working group. The objector might convince the rest of the group that the objections are valid and the working group might choose a different path. Conversely, the working group might convince the objector that the concerns can be addressed, or that the choice is simply unappealing (i.e., something the objector can "live with") and not a show-stopper. In any event, closure is much more likely to be achieved quickly by asking for and trying to accommodate the objections rather than asking for agreement.

The above discussion does not mean that sorting out disagreements is the only thing that needs to be done for successful consensus. An engineering solution that has no objections, but also has no base of support and is met with complete apathy, is not a solution that has any useful sort of consensus. Consensus does require the active engagement and eventual support of those who are working on the solution. However, finding mere "agreement" among participants is not enough. People might very well agree that a solution is

sufficient and have no objection to it, but if they also don't actively think it's a good and correct outcome, it's absurd to declare that the group has consensus.

There is also an important point to be made about reaching consensus and "compromising": Unfortunately, the word "compromise" gets used in two different ways, and though one sort of compromising to come to consensus is good (and important), the other sort of compromising in order to achieve consensus can actually be harmful. As mentioned earlier, engineering always involves balancing tradeoffs, and figuring out whether one engineering decision makes more sense on balance compared to another involves making engineering "compromises": We might have to compromise processor speed for lower power consumption, or compromise throughput for congestion resistance. Those sorts of compromises are among engineering choices, and they are expected and essential. We always want to be weighing tradeoffs and collectively choosing the set that best meets the full set of requirements.

However, there is another sense of "compromise" that involves compromising between people, not engineering principles. For example, a minority of a group might object to a particular proposal, and even after discussion still think the proposal is deeply problematic, but decide that they don't have the energy to argue against it and say, "Forget it, do what you want". That surely can be called a compromise, but a chair might mistakenly take this to mean that they agree, and have therefore come to consensus. But really all that they've done is capitulated; they've simply given up by trying to appease the others. That's not coming to consensus; there still exists an outstanding unaddressed objection. Again, if the objection is only that the choice is not ideal but is otherwise acceptable, such a compromise is fine. But conceding when there is a real outstanding technical objection is not coming to consensus.

Even worse is the "horse-trading" sort of compromise: "I object to your proposal for such-and-so reasons. You object to my proposal for this-and-that reason. Neither of us agree. If you stop objecting to my proposal, I'll stop objecting to your proposal and we'll put them both in." That again results in an "agreement" of sorts, but instead of just one outstanding unaddressed issue, this sort of compromise results in two, again ignoring them for the sake of expedience.

These sorts of "capitulation" or "horse-trading" compromises have no place in consensus decision making. In each case, a chair who looks for "agreement" might find it in these examples because it appears that people have "agreed". But answering technical disagreements is what is needed to achieve consensus, sometimes even when the people who stated the disagreements no longer wish to discuss them.

Coming to consensus is when everyone (including the person making the objection) comes to the conclusion that either the objections are valid, and therefore make a change to address the objection, or that the objection was not really a matter of importance, but merely a matter of taste. Of course, coming to full consensus like that does not always happen. That's why in the IETF, we talk about "rough consensus".

3. Rough consensus is achieved when all issues are addressed, but not necessarily accommodated

The preceding discussion gives an example where the working group comes to consensus on a point: Either the objector is satisfied with the answer to the objection, or the working group is satisfied that the objection is valid and changes course. But that doesn't happen all of the time, and it's certainly not the problematic case. Again, engineering is always a set of tradeoffs. Often, a working group will encounter an objection where everyone understands the issue and acknowledges that it is a real shortcoming in the proposed solution, but the vast majority of the working group believes that accommodating the objection is not worth the tradeoff of fixing the problem.

So, an objector might say, "The proposal to go with protocol X is much more complicated than going with protocol Y. Protocol Y is a much more elegant and clean solution, which I can code much more easily, and protocol X is a hack." The working group might consider this input, and someone might respond, "But we have a great deal of code already written that is similar to protocol X. While I agree that protocol Y is more elegant, the risks to interoperability with an untested solution are not worth it compared to the advantages of going with the well-understood protocol X." If the chair finds, in their technical judgement, that the issue has truly been considered, and that the vast majority of the working group has come to the conclusion that the tradeoff is worth making, even in the face of continued objection from the person(s) who raised the issue, the chair can declare that the group has come to rough consensus. (And even though this is framed in terms of a "vast majority", even that is not necessarily true. This point is discussed in more detail in Sections 6 and 7.)

Note that this portrays rough consensus as a fallback. In one sense, it is: As a working group does its work and makes its choices, it behaves as if it is striving toward full consensus and tries to get all issues addressed to the satisfaction of everyone in the group, even those who originally held objections. It treats rough consensus as a sort of "exception processing", to deal with cases where the person objecting still feels strongly that their objection is valid

and must be accommodated. But it is certainly true that, more often than not in the IETF, at least someone in the group will be unsatisfied with a particular decision. In that sense, rough consensus might be closer to the norm than the exception. However, when a participant says, "That's not my favorite solution, but I can live with it; I'm satisfied that we've made a reasonable choice", that participant is not in the "rough" part of a rough consensus; the group actually reached consensus if that person is satisfied with the outcome. It's when the chair has to declare that an unsatisfied person still has an open issue, but that the group has truly answered the objection, that the consensus is only rough.

Now, a conclusion of having only rough consensus relies heavily on the good judgement of the consensus caller. The group must truly consider and weigh an issue before the objection can be dismissed as being "in the rough". ("In the rough" is terminology from golf. "The rough" is the term for the longer grass at the side of the fairway, and if your ball has landed in the rough you are off course and away from the normal direction of play. The phrase gets used quite a bit in the IETF as a play on words to complement "rough consensus" meaning that you are "in the rough" if you find yourself not agreeing with the rough consensus.) The chair of a working group who is about to find that there is only rough consensus is going to have to decide that not only has the working group taken the objection seriously, but that it has fully examined the ramifications of not making a change to accommodate it, and that the outcome does not constitute a failure to meet the technical requirements of the work. In order to do this, the chair will need to have a good idea of the purpose and architecture of the work being done, perhaps referring to the charter of the working group or a previously published requirements document, or even consulting with other experts on the topic, and then the chair will use their own technical judgement to make sure that the solution meets those requirements. It is possible that the chair can come to the wrong conclusion, and the chair's conclusion is always appealable should that occur, but the chair must use their judgement in these cases. What can't happen is that the chair bases their decision solely on hearing a large number of voices simply saying, "The objection isn't valid." That would simply be to take a vote. A valid justification needs to be made.

It is important to recognize that this view of rough consensus is a change from the way it sometimes has been characterized in the IETF. RFC 1603 [RFC1603] described rough consensus as the "dominant view" of the group:

Working groups make decisions through a "rough consensus" process. IETF consensus does not require that all participants agree although this is, of course, preferred. In general the dominant view of the working group shall prevail. (However, it must be noted that "dominance" is not to be determined on the basis of volume or persistence, but rather a more general sense of agreement.) Consensus can be determined by balloting, humming, or any other means on which the WG agrees (by rough consensus, of course).

The above says that consensus can be "determined" by balloting and humming, and there are certainly IETF folks who have thought of rough consensus as being primarily about the percentage of people who agree with a decision. Indeed, RFC 2418 [RFC2418] adds on to the above text by stating, "Note that 51% of the working group does not qualify as 'rough consensus' and 99% is better than rough." This document actually disagrees with the idea that simply balloting or otherwise looking at percentages can "determine" consensus. While counting heads might give a good guess as to what the rough consensus will be, doing so can allow important minority views to get lost in the noise. One of the strengths of a consensus model is that minority views are addressed, and using a rough consensus model should not take away from that. That is why this document talks a great deal about looking at open issues rather than just counting the number of people who do or do not support any given issue. Doing so has some interesting and surprising implications that are discussed in subsequent sections.

Any finding of rough consensus needs, at some level, to provide a reasoned explanation to the person(s) raising the issue of why their concern is not going to be accommodated. A good outcome is for the objector to understand the decision taken and accept the outcome, even though their particular issue is not being accommodated in the final product.

Remember, if the objector feels that the issue is so essential that it must be attended to, they always have the option to file an appeal. A technical error is always a valid basis for an appeal. The chair in making the consensus call (or whoever is responsible to hear an appeal) may determine that the issue was addressed and understood, but they also have the freedom and the responsibility to say, "The group did not take this technical issue into proper account" when appropriate. Simply having a large majority of people

agreeing to dismiss an objection is not enough to claim there is rough consensus; the group must have honestly considered the objection and evaluated that other issues weighed sufficiently against it. Failure to do that reasoning and evaluating means that there is no true consensus.

4. Humming should be the start of a conversation, not the end

We don't vote in the IETF. In some ways, we can't vote: Since the IETF is not a membership organization, it's nearly impossible to figure out who would get a vote for any given question. We can't know who the "members" of any given working group would be at any one time, and we certainly can't know who all of the "members" of the IETF would be: That's why we refer to "participants" in the IETF; the IETF doesn't really have "members". Indeed, we often recruit additional implementers and other experts into working groups in order to ensure that broader views are brought into the discussion. So, voting is simply not practical. We've also decided that coming to consensus (albeit sometimes rough consensus) is an important thing to do. Final decisions are supposed to be taken on the mailing list, which reinforces the idea that we come to consensus by looking at the open issues and not counting heads. We do, on occasion, take informal polls to get a sense of the direction of the discussion, but we try not to treat a poll as a vote that decides the issue. When we do discuss things face-to-face, we don't want to vote there either; we want to show that we are coming to consensus. So, sometimes, to reinforce the notion that we're not voting, instead of a show of hands, we often "hum".

However, more and more we see people who think that a hum is a sort of anonymous vote, with some chairs calling every question they have for the working group by asking for a hum and judging the result by the loudest hum, even saying things like, "There were lots of hums for choice 1 and very few hums for choice 2, so it sounds like we have rough consensus for choice 1." This misses some really important points of using humming and is almost certainly mis-assessing the consensus. Hums should not be used as votes.

So, why should we engage in this strange practice of humming? What are good reasons to "take a hum"? One reason is pragmatic. Quite often, a chair is faced with a room full of people who seem to be diametrically opposed on some choice facing the group. In order to find a starting place for the conversation, it can be useful for the chair to ask for a hum to see if one of the choices already has a stronger base of support than the other (or any significant base of support at all, for that matter). Sometimes the hum can tell a chair

that the room isn't all that contentious after all, that it's just a few voices who were being especially vociferous during the initial discussion.

Sometimes, the hum will make it clear that choice "foo" has a significant amount more support than choice "bar", and it is therefore likely easier to start the discussion by saying, "OK, 'foo' seems to have quite a bit of support. Let's have the people that think 'foo' is a bad idea come up and tell us why it is problematic." At that point, the group can start going through the issues and see if any of them are showstoppers. It could always turn out that one of the objections is instantly recognized by the entire group as a fatal flaw in "foo" and the group will then turn to a discussion of the merits (and demerits) of "bar" instead. All that the hum does is give the chair a starting point: The hum indicated that there were less objections to "foo" than to "bar" at the beginning of the discussion, so starting with the objections to "foo" might shorten the discussion.

Another good reason for us to hum is because it actually gives the chair the opportunity to take the temperature of the room. A smaller bunch of loud hums for choice A and a larger number of non-committal hums for choice B might indicate that some people believe that there are serious problems with choice B, albeit the more popular by sheer number of people. The chair might decide that starting with choice A and getting objections to it is the easier path forward and more likely to result in consensus in the end. Remember, coming to consensus is a matter of eliminating disagreements, so the chair wants to choose the path that gets to the least objections fastest. A bunch of people who are not strongly committed to B might have no real technical objection to A, even though it is not their first preference. There is always a chance that this could be misleading, or even abused, because some people are more willing to hum loudly than others (just by dint of personality), or that one of the quieter hums actually turns out to be a show-stopper that makes the original choice impossible. However, keep in mind that taking the hum in this case is to figure out how to start the conversation. The chair could always be surprised because the hum turns out to be unanimous and no further discussion is needed. Otherwise, the hum begins the discussion, it doesn't end it.

But couldn't all of the above could have been done with a show of hands instead of a hum? Absolutely. Indeed, on a mailing list there is no way to use humming and so a different kind of polling would be needed. Even in face-to-face situations, sometimes we do use a show of hands. But there are more symbolic reasons for using a hum instead of a show of hands when face-to-face: Of course, a chair could get the temperature of the room by doing a show of hands too,

and knowing who specifically feels one way or another can help a good chair guide the subsequent conversation. However, a show of hands might leave the impression that the number of people matters in some formal way. A chair and a working group with a solid understanding of how consensus works can certainly do a show of hands and achieve exactly the same result as a hum. But with less experienced folks, a show of hands can end up reinforcing the mistaken notion that a vote is taking place. A chair can always take the hum and then later ask for specific folks to identify themselves to elicit more discussion. The advantage of the hum is that it makes it perfectly clear that the chair is simply figuring out the direction of the conversation.

This also points to another misuse of any kind of informal polling: If the chair is already convinced that the group has come to consensus, there isn't much reason to take a poll. In fact, taking a poll can serve to discourage those who might be in the minority from voicing their concerns to the group in the face of a large majority who wants to move forward. Often, the right thing for the chair to do if they already sense consensus is to say, "It sounds to me like we have consensus for choice A. Does anybody have any concerns about or objections to going with A?" This allows folks to bring up issues to the group that the chair might have mistakenly missed without having them feel that the majority has "already spoken".

The reverse situation can also have similar advantages and disadvantages: Sometimes a chair (say, of a birds-of-a-feather session, or a working group discussing a new proposed document) might want to make sure that there really is a good base of support to go forward with a proposal, and takes a hum. This can let the chair see if there are more than a handful of active people who are really interested in the new work. However, this has pitfalls as well: Someone may be dissuaded from raising what could be an essential concern if they feel that the group is overwhelmingly in favor of going forward, or conversely some folks may decide to "hum along with the crowd" even though they're not committed to the outcome. Indeed, the formulation, or even the order, of questions asked during a hum can have huge effects on the outcome: Asking simply, "Who supports going forward with this proposal?", and asking it first, can itself cause more people to hum in the affirmative than would for differently formulated questions, or asking the same question after some more "negatively" framed questions. Any sort of polling, whether hums or even a show of hands, must be done with caution and should almost always be used to prompt discussion and questions, not to conclude the matter.

There are times where the result of a hum is a pretty even split. In practical terms, that means it doesn't matter where the chair starts the discussion. And in fact, we've had working groups where a coin

flip decided which proposal to start with. That doesn't mean that the coin flip determined the outcome; if a fatal technical flaw was found in the solution that won the coin flip, it is still incumbent upon the group to address the issue raised or abandon that solution and find another. Rough consensus on the technical points, in the end, is always required. Any way to find a place to start, be it the hum or the coin flip, is only getting to the beginning of the discussion, not the end.

5. Consensus is the path, not the destination

We don't try to reach consensus in the IETF as an end in itself. We use consensus-building as a tool to get to the best technical (and sometimes procedural) outcome when we make decisions. Experience has shown us that traditional voting leads to gaming of the system, "compromises" of the wrong sort as described earlier, important minority views being ignored, and, in the end, worse technical outcomes.

Coming to consensus by looking for objections, tracking open issues, and using hums as the start of discussions and not the end can all take some patience. Indeed, sometimes objection-based or issue-based decision making can be extremely difficult because there can be large factions who have diametrically opposed views. And there is no doubt that we do see some amount of political compromise (that is, the undesirable kind of compromise) from time to time in the IETF.

However, accepting these things has its price. When we decide that a discussion is too factious and opt to simply go with a majority, it creates more polarized arguments in the future: Instead of working toward the best technical outcome that most everyone can accept, people are much quicker to run to opposing sides and dig in to their positions. And when we allow real technical issues to drop because proponents have simply capitulated or have "horse-traded" to allow other technical problems to remain, the end product is weaker. Though the IETF can never be perfectly principled with regard to rough consensus, failing to be vigilant about sticking to the principles makes it increasingly hard to stick to them in the future, and ends us up with worse technical output.

Again, coming to consensus is not the goal in itself. Coming to consensus is what we do during our processes to arrive at the best solution. In particular, "declaring" consensus is not an end goal. Attempts to declare consensus at the end of a discussion just for the sake of being able to say that there is consensus often get us back into the voting mentality that we're trying to avoid.

We often hear chairs say that they are making a "consensus call". Sometimes, they simply mean they are making a call of the consensus; that is, they are declaring the consensus that has, in their view, been reached when the discussion has reached an end. That's a fine thing and what chairs are supposed to do: They are "calling" the consensus. Sometimes, when a chair says that they are making a "consensus call", the chair is actually making a call for discussion of a particular point in order to reach consensus. Although it's a bit odd to call that a "consensus call" (as opposed to a "call for discussion" or the like), it is fine for a chair to occasionally identify a particular point of contention and get the group to focus discussion on it in order to reach consensus. But more and more often, we hear chairs say that they are making a "consensus call" at the end of a discussion, where the chair will pose the classic "Who is in favor of choice A? Who is in favor of choice B?" questions to the working group. That's not really a "consensus call", and has the same potential problems as the "hum" at the end of a discussion: It can be tantamount to asking for a vote. Even talk of "confirming consensus" has this problem: It implies that you can confirm that there is consensus by counting people, not issues. The important thing for a chair to do is to "call consensus" in the sense of declaring the consensus; others can always object and say that the chair has gotten the consensus wrong and ask for reconsideration. However, the chair ought to be looking for consensus throughout the discussion, not asking for it at the end.

There are some times where chairs will ask a question or take a poll toward the end of a discussion in order to figure out the state of consensus, but this must be done with extreme caution. This is discussed in the next section.

6. One hundred people for and five people against might not be rough consensus

Section 3 discussed the idea of consensus being achieved when objections had been addressed (that is, properly considered, and accommodated if necessary). Because of this, using rough consensus avoids a major pitfall of a straight vote: If there is a minority of folks who have a valid technical objection, that objection must be dealt with before consensus can be declared. This also reveals one of the great strengths of using consensus over voting: It isn't possible to use "vote stuffing" (simply recruiting a large number of people to support a particular side, even people who have never participated in a working group or the IETF at all) to change the outcome of a consensus call. As long as the chair is looking for outstanding technical objections and not counting heads, vote stuffing shouldn't affect the outcome of the consensus call.

So, in a large working group with over 100 active participants and broad agreement to go forward with a particular protocol, if a few participants say, "This protocol is going to cause congestion on the network, and it has no mechanism to back off when congestion occurs; we object to going forward without such a mechanism in place", and the objection is met with silence on the mailing list, there is no consensus. Even if the working group chair makes a working group "last call" on the document, and 100 people actively reply and say, "This document is ready to go forward", if the open issue hasn't been addressed, there's still no consensus, not even rough consensus. It's the existence of the unaddressed open issue, not the number of people, which is determinative in judging consensus. As discussed earlier, you can have rough consensus with issues that have been purposely dismissed, but not ones that have been ignored.

This brings us back to when a poll could be used (cautiously) at the end of a discussion. Let's say a discussion has been ongoing for some time, and a particular objection seems to be holding up the decision. A diligent chair who's been carefully listening to the discussion might think, "I have heard person X make this objection, and I've heard responses from many other folks that really address the issue. I think we have rough consensus. But the objection keeps coming up. Maybe it's just the one person getting up again and again with the same argument, but maybe we don't have rough consensus. I'm not sure." At this point, the chair might ask for a hum. If only a single hum objecting can be heard, even a loud one, in the face of everyone else humming that the objection has been answered, the chair has pretty good reason to believe that they heard the single objection all along and it really has been addressed. However, to say immediately after the hum, "It sounds like we have rough consensus" and nothing else is at best being slipshod: What the chair really needs to say at that point is, "I believe the only objection we've heard is A (coming from person X), and I've heard answers from the group that fully address that issue. So, unless I hear a different objection than the one I've just described, I find that there is rough consensus to move on." That leaves the door open for someone to tell the chair that the objection was really on different grounds and they misevaluated, but it makes it clear that the chair has found rough consensus due to the discussion, not due to the hum. Again, it's not the hum that ends things, it's that the issues have been addressed. If the small minority (even one person) still has an issue that hasn't been addressed, rough consensus still hasn't been achieved.

Even if no particular person is still standing up for an issue, that doesn't mean an issue can be ignored. As discussed earlier, simple capitulation on an issue is not coming to consensus. But even in a case where someone who is not an active participant, who might not

care much about the fate of the work, raises a substantive issue and subsequently disappears, the issue needs to be addressed before the chair can claim that rough consensus exists.

7. Five people for and one hundred people against might still be rough consensus

This one is the real mind-bender for most people, and certainly the most controversial. Say there is a very small working group, one with half a dozen truly active participants who are experts in the field; everybody else is just following along but not contributing to the discussion. The active folks come up with a protocol document that they all agree is the right way forward, and people inside and outside the working group agree that the protocol is likely to get widespread adoption; it is a good solution to a real problem, even if the non-experts don't have the ability to fully judge the details.

However, one of the active members has an objection to a particular section: The protocol currently uses a well-known algorithm to address an issue, but the objector has a very elegant algorithm to address the issue, one which works especially well on their particular piece of hardware. There is some discussion, and all of the other contributors say, "Yes, that is elegant, but what we're using now is well-understood, widely implemented, and it works perfectly acceptably, even on the objector's hardware. There is always some inherent risk to go with a new, albeit more elegant, algorithm. We should stick to the one we've got." The chair follows the conversation and says, "It sounds like the issue has been addressed and there's consensus to stick with the current solution." The objector is not satisfied, maybe even saying, "But this is silly. You've seen that my algorithm works. We should go with that." The chair makes the judgement that the consensus is rough, in that there is still an objector, but the issue has been addressed and the risk argument has won the day. The chair makes a working group last call.

Then, the worst-case scenario happens. The objector, still unhappy that their preferred solution was not chosen, recruits one hundred people, maybe a few who were silent participants in the working group already, but mostly people who work at the same company as the objector and who never participated before. The objector gets them all to post a message to the list saying, "I believe we should go with the new elegant algorithm in section Z instead of the current one. It is more elegant, and works better on our hardware." The chair sees these dozens of messages coming in and posts a query to each of them: "We discussed this on the list, and we seemed to have consensus that, given the inherent risk of a new algorithm, and the widespread deployment of this current one, it's better to stick with the current one. Do you have further information that indicates

something different?" And in reply the chair gets utter silence. These posters to the list (say, some of whom were from the company sales and marketing department) thought that they were simply voting and have no answer to give. At that point, it is within bounds for the chair to say, "We have objections, but the objections have been sufficiently answered, and the objectors seem uninterested in participating in the discussion. Albeit rough in the extreme, there is rough consensus to go with the current solution."

Though the above example uses the most extreme form of recruiting sheer numbers of people (i.e., from the sales and marketing department), the same principle should hold true no matter how new or how credible the objectors seem: The chair is trying to discover whether objections have been addressed or if there are still open issues. If, instead of a bunch of sales and marketing people, the new people to the conversation are developers or others who are directly involved in creating the technology, or even folks who have been participating the entire time whose knowledge of the technology is not in question at all, the principle is still the same: If the objection has been addressed, and the new voices are not giving informed responses to that point, they can still justifiably be called "in the rough". Of course, the more involved and knowledgeable the objectors are, the more difficult it will be for the consensus caller to make the call, but a call of rough consensus is reasonable. The chair in this case needs to understand what the responses mean; only sufficiently well-informed responses that justify the position taken can really "count".

There is no doubt that this is the degenerate case and a clear indication of something pathological. But, this is precisely what rough consensus is ideally suited to guard against: vote stuffing. In the presence of an objection, the chair can use their technical judgement to decide that the objection has been answered by the group and that rough consensus overrides the objection. Now, the case described here is probably the hardest call for the chair to make (how many of us are willing to make the call that the vast majority of people in the room are simply stonewalling, not trying to come to consensus?), and, if appealed, it would be incredibly difficult for the appeals body to sort out. Indeed, it is likely that if a working group got this dysfunctional, it would put the whole concept of coming to rough consensus at risk. But still, the correct outcome in this case is to look at the very weak signal against the huge background noise in order to find the rough consensus.

8. Conclusion

Although this document talks quite a bit about the things chairs, working groups, and other IETF participants might do to achieve rough consensus, this document is not really about process and procedures. It describes a way of thinking about how we make our decisions. Sometimes, a show of hands can be useful; sometimes, it can be quite damaging and result in terrible decisions. Sometimes, using a device like a "hum" can avoid those pitfalls; sometimes, it is just a poorly disguised vote. The point of this document is to get all of us to think about how we are coming to decisions in the IETF so that we avoid the dangers of "majority rule" and actually get to rough consensus decisions with the best technical outcomes.

9. Security Considerations

"He who defends with love will be secure." -- Lao Tzu

10. Informative References

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Appendix A. Acknowledgements

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