

**From:** [Regenscheid, Andrew R. \(Fed\)](#)  
**To:** [Kelsey, John M. \(Fed\)](#)  
**Subject:** Re: PQC  
**Date:** Monday, June 29, 2020 12:27:30 PM

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I don't think that's strong enough.

By having two tracks, we're sending the message that people that they should focus their attention on the finalists. And in general, that makes sense, even though we have a couple different categories of algorithms in the alternates list. I don't think SPHINCS+ or Frodo probably need that much close attention to feel comfortable with them, but there might be some smaller things you'd want to make sure you understand before standardizing. Maybe discussions of parameters. Or maybe implementation pitfalls. Those are things people might not bother to spend much time on now because they: 1) don't think we're going to standardize on them right away, and 2) might not be big enough results to write a paper on.

My assumption is that if we're ultimately going to pick one of alternates for standardization, we're likely to know there's a good chance of that several months ahead of time. So I think it makes sense to signal that strongly and clearly, and not simply through something like a PQC forum post.

You're right, of course, that doing something like that doesn't change the fact that the algorithm was originally chosen as an alternate. I just didn't want to come up with some sort of new label for an alternate algorithm that's now under serious consideration for immediate standardization.

-Andy

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**From:** Kelsey, John M. (Fed) <john.kelsey@nist.gov>  
**Sent:** Monday, June 29, 2020 12:15 PM  
**To:** Regenscheid, Andrew R. (Fed) <andrew.regenscheid@nist.gov>  
**Subject:** Re: PQC

So we should just say that we might choose to standardize either alternates or finalists at the end of the third round, but we are more likely to standardize finalists at the end of the third round, and more likely to need some additional time before standardizing alternates.

--John

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**From:** "Regenscheid, Andrew R. (Fed)" <andrew.regenscheid@nist.gov>  
**Date:** Monday, June 29, 2020 at 12:12  
**To:** "Kelsey, John M. (Fed)" <john.kelsey@nist.gov>, "Moody, Dustin (Fed)" <dustin.moody@nist.gov>, internal-pqc <internal-pqc@nist.gov>

**Subject:** Re: PQC

One of the main things you want in these processes is predictability. It's not enough to say we might do something- people have to expect it. We learned that one in SHA-3.

I've been somewhat concerned that we're sending mixed messages the alternates. In general, we're saying we don't plan to standardize any of them right away (until after a 4th round) except that we want to carve out some leeway so that we could if we really wanted to. The main case for that would probably be SPHINCS+, which we allude to in the report. Perhaps you could imagine Frodo being another case for that.

I don't think we want there to be any surprise if we get to the end of round 3 and we decide we're going to standardize SPHINCS+, Frodo, or one of the other four examples John cited. I think we'd want to signal that clearly, and somewhat formally, in advance. That's where the idea of "elevating" an alternate to a finalist came in.

-Andy

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**From:** Kelsey, John M. (Fed) <john.kelsey@nist.gov>

**Sent:** Monday, June 29, 2020 12:03 PM

**To:** Moody, Dustin (Fed) <dustin.moody@nist.gov>; internal-pqc <internal-pqc@nist.gov>

**Subject:** Re: PQC

It seems weird to phrase it that way. I think the point of Andy's sentence there is that we may decide to standardize one of the alternates at the end of the third round, right? But I don't think that would change the fact that we had already named some things as finalists and others as alternates. I mean, if all the structured lattice KEMs get broken or dented and we decide to standardize Frodo at the end of the third round, it wouldn't mean that Kyber and Saber and NTRU got demoted to being alternates—it would mean that we just decided to standardize one of our alternates instead of one of our finalists.

That's a plausible outcome, as far as I can tell, for five or six alternates: SPHINCS+, GeMSS, HQC, SIKE, Frodo, and maybe BIKE. For example, imagine that over the next 18 months, we get a bunch of results that make us uneasy about the parameter selection for structured lattice schemes, and at the same time, there's a very clear upper bound on error rate for BIKE that lets them get CCA security. It seems very plausible to me that we standardize Frodo and BIKE as KEMs in that world. Then maybe we standardize a structured lattice KEM in another couple years when we feel like we know how the parameters should be selected.

But I don't think that would change the fact that Frodo and BIKE were both alternates instead of finalists. I can't imagine that we'd want to, say, announce that we'd demoted Saber to an alternate and Frodo to a finalist, six months from now.

--John

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**From:** "Moody, Dustin (Fed)" <dustin.moody@nist.gov>

**Date:** Monday, June 29, 2020 at 11:49

**To:** internal-pqc <internal-pqc@nist.gov>

**Subject:** PQC

Everyone,

I don't have any plans for a meeting tomorrow. Let me know if you think we need one. The reviews for the report are still on going, and I'll make changes to suggestions we get back.

Here's one Andy recommended we add in:

"It is possible that new analysis could result in an alternate candidate being elevated to being a finalist, in the case that NIST's confidence in the security of any of the finalists is greatly reduced."

Seems reasonable to me. It doesn't tie our hands and keeps our options open in case of an unexpected advance that breaks a finalist.

Dustin