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Clarifying when Standards Track Documents may Refer Normatively to
Documents at a Lower Level
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Abstract

IETF procedures generally require that a standards track RFC may not have a normative reference to another standards track document at a lower maturity level or to a non standards track specification (other than specifications from other standards bodies). For example a standards track document may not have a normative reference to an informational RFC. There are needs for exceptions to this rule, often caused by the IETF using informational RFCs to describe non-

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IETF standards, or IETF-specific modes of use of such standards. This document clarifies and updates the procedure used in these circumstances.

1. Normative References Expected to be to Equal or Higher Level

The Internet Standards Process [\[RFC2026\]](#) [Section 4.2.4](#) specifies:

Standards track specifications normally must not depend on other standards track specifications which are at a lower maturity level or on non standards track specifications other than referenced specifications from other standards bodies.

One intent is to avoid creating a perception that a standard is more mature than it actually is.

It should also be noted that Best Current Practice documents [\[RFC1818\]](#) have generally been considered similar to Standards Track documents in terms of what they can reference. For example, a normative reference to an Experimental RFC has been considered an improper reference per [\[RFC2026\]](#).

1.1 Normative References

Within an RFC, references to other documents fall into two general categories: "normative" and "informative". Broadly speaking, a normative reference specifies a document that must be read to fully understand or implement the subject matter in the new RFC, or whose contents are effectively part of the new RFC in the sense that its omission would leave the new RFC incompletely specified. An informative reference is not normative; rather, it provides only additional, background information.

An exact and precise definition of what is (and is not) a normative reference has proven challenging in practice, as the details and implications can be subtle. Moreover, whether a reference needs to be normative can depend on the context in which a particular RFC is being published in the first place. For example, in an IETF Standard's context, it is important that all dependent pieces be clearly specified and available in an archival form, so that there is

no disagreement over what constitutes a standard. This is not always the case for other documents.

The rest of this section provides guidance on what might (and might not) be considered normative in the context of the IETF standards process.

In the IETF, it is a basic assumption that implementors must have a clear understanding of what they need to implement in order to be fully compliant with a standard and to be able to interoperate with other implementations of that standard. For documents that are referenced, any document that includes key information an implementer

needs would be normative. For example, if one needs to understand a packet format defined in another document in order to fully implement a specification, the reference to that format would be normative. Likewise, if a reference to a required algorithm is made, the reference would be normative.

Some specific examples:

- if a protocol relies on IPsec to provide security, one cannot fully implement the protocol without the specification for IPsec also being available; hence, the reference would be normative. The referenced specification would likely include details about specific key management requirements, which transforms are required and which are optional, etc.
- in the case of MIB documents, an IMPORTS clause by definition is a normative reference.
- when a reference to an example is made, such a reference need not be normative. For example, text such as "an algorithm such as the one specified in [RFCxxx] would be acceptable" indicates an informative reference, since that cited algorithm is just one of several possible algorithms that could be used.

[2.](#) The Need for Downward References

There are a number of circumstances where an IETF document may need to make a normative reference to a document at a lower maturity level, but such a reference is in conflict with [Section 4.2.4 of](#)

[\[RFC2026\]](#). For example:

- o A standards track document may need to refer to a protocol or algorithm developed by an external body but modified, adapted, or profiled by an IETF informational RFC, for example MD5 [\[RFC1321\]](#) and HMAC [\[RFC2104\]](#). Note that this does not override the IETF's duty to see that the specification is indeed sufficiently clear to enable creation of interoperable implementations.
- o A standards document may need to refer to a proprietary protocol, and the IETF normally documents proprietary protocols using informational RFCs.
- o A migration or co-existence document may need to define a standards track mechanism for migration from, and/or co-existence with, an historic protocol, a proprietary protocol, or possibly a non-standards track protocol.
- o There are exceptional procedural or legal reasons which force the target of the normative reference to be an informational or historical RFC, or for it to be at a lower standards level than the referring document.

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- o A BCP document may want to describe best current practices for experimental or informational specifications.

[3.](#) The Procedure to be Used

For Standards Track or BCP documents requiring normative reference to documents of lower maturity, the normal IETF Last Call procedure will be issued, with the need for the downward reference explicitly documented in the Last Call itself. Any community comments on the appropriateness of downward references will be considered by the IESG as part of its deliberations.

Once a specific down reference to a particular document has been accepted by the community (e.g., has been mentioned in several Last Calls), an Area Director may waive subsequent notices in the Last Call of down references to it. This should only occur when the same document (and version) are being referenced and when the AD believes that the document's use is an accepted part of the community's understanding of the relevant technical area. For example, the use of MD5 [\[RFC1321\]](#) and HMAC [\[RFC2104\]](#) is well known among cryptographers.

This procedure should not be used when the appropriate step to take is to move the document to which the reference is being made into the appropriate category. I.e., this is not intended as an easy way out of normal process. Rather, it is intended for dealing with specific cases where putting particular documents into the required category is problematical and unlikely to ever happen.

[4.](#) Security Considerations

This document is not known to create any new vulnerabilities for the Internet. On the other hand, inappropriate or excessive use of the process might be considered a down-grade attack on the quality of IETF standards, or worse, on the rigorous review of security aspects of standards.

[5.](#) Acknowledgments

This document is the result of discussion within the IESG, with particular contribution by Harald Alvestrand, Steve Bellovin, Scott Bradner, Ned Freed, Allison Mankin, Jeff Schiller, and Bert Wijnen.

Normative References

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[RFC2104] Krawczyk, H., Bellare, M. and R. Canetti, "HMAC: Keyed-Hashing for Message Authentication", [RFC 2104](#), February 1997.

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