

# Requirements

The requirements below have been taken from the RFC, each requirement includes a description an example test, and in some cases a list of edge cases tests, tests and descriptions for extensions have not been given if no work has been done on their implementation.

Progress on requirements [here](#)

## Core - 1

### Basic - 1

#### Control Plane - 1

##### Flooding - 1111

Every packet received should be forwarded to every interface but the originating one.  
Overridden by static.

**Test:** Given a packet, check every other interface receives it, and the sending interface does not

**Edge cases:** No other interfaces

##### Static - 1112

Read a configuration file with known addresses & interfaces, forward as per the file, else send to default route (also defined in the file)

**Test:** Given packets from every known address to every known address sent correctly, with no additional sends

**Edge cases:** Address not known, address very similar (last/first bit different), loopback address, multicast address, unspecified address, loopback address, link local addresses

#### Data Plane - 2

##### Header - 1

##### *Payload Length - 11211*

<https://tools.ietf.org/html/rfc8200#section-3>

Must correctly forward the correct amount of data based on the length in this field

**Test:** Given a packet containing X in this field must forward X bytes

**Edge cases:** Packet length 0, Packet length = packet size, packet length > packet size, packet length < packet size

##### *Hop Limit - 11212*

<https://tools.ietf.org/html/rfc8200#section-3>

Must correctly discard all packets to be forwarded with a hop limit of 0, and decrement the hop limit of all packets

**Test:** Given a packet with a hop limit of X, hop limit should be X-1 when forwarded, or not forwarded if X-1 = 0

**Edge cases:** Hop limit = 0, Hop limit < 0, Hop limit = 0 but router is recipient, Hop limit < 0 but router is recipient.

## Addressing (Unicast) - 3

### *Internal Structure - 1131*

Assume addresses have no internal structure - simplest

**Test:** Random destination addresses that are not in the immediate network are always treated the same

## Advanced - 2

### ICMPv6 - 1

<https://tools.ietf.org/html/rfc4443>

#### Checksum 1211

ICMPv6 packets with incorrect checksums should be dropped (only if router is destination)

**Test:** Random bit changes to packets so that checksum is incorrect

#### Unknown 1212

ICMPv6 packets of unknown type must be silently discarded (if router is destination)

**Test:** Packets with a variety of unknown types that are otherwise valid

#### Rate limit 1213

Router must apply some form of rate limiting

**Test:** Try and trigger more than limit of responses

#### Packet too big 1214

Sent to sender when a packet cannot be forwarded due to size

**Test:** Send a packet that is too big to be forwarded

#### Time exceeded 1215

Sent to a sender when a packet's hop limit is decremented to 0

**Test:** Send a packet with hop\_limit of 0 or 1

#### Echo 1216

Must reply to echo request messages

**Test:** Send an echo request message

## Parameter Problem 1217

Sent to a sender when there is an issue with an ipv6\_header

**Test:** Send packets with an erroneous header, unrecognised next header type, and unrecognised ipv6 option

## Uniquely Identify 1218

Do not send ICMPv6 responses if a packets source address is the unspecified address, a multicast address or an anycast address.

**Test:** Send response triggering messages with the above source addresses

## Multicast - 2

<https://tools.ietf.org/html/rfc4291#section-2.7>

Solicited node address

(e.6) A packet whose source address does not uniquely identify a single node -- e.g., the IPv6 Unspecified Address, an IPv6 multicast address, or an address known by the ICMP message originator to be an IPv6 anycast address.

## Anycast - 3

<https://tools.ietf.org/html/rfc4291#section-2.6>

## Scoped Addresses - 4

# Extension - 2

## Optional Requirements from Core - 1

*Traffic Class*

<https://tools.ietf.org/html/rfc8200#section-7>

*Flow Label*

<https://tools.ietf.org/html/rfc8200#section-6>

*Next Header*

Header field, may be used to optimise

*Text Representation of Addresses and Prefixes*

<https://tools.ietf.org/html/rfc4291#section-2.2>

For logging

*More Unicast*

<https://tools.ietf.org/html/rfc4291#section-2.5>

## Extension Headers - 2

<https://tools.ietf.org/html/rfc8200#section-4>

Hop-by-Hop Options - <https://tools.ietf.org/html/rfc8200#appendix-A>

Fragment

Destination Options

Routing - <https://tools.ietf.org/html/rfc8200#section-8.4>

Authentication

Encapsulating Security Payload

And order checks

Check IPv6 parameters for full list

## DHCPv6 - 3

<https://tools.ietf.org/html/rfc3315>

## SLAAC - 4

<https://tools.ietf.org/html/rfc4862>

## TCP & UDP - 5

<https://tools.ietf.org/html/rfc8200#section-8> but not 8.4

## Optimisation - 6

## IPSec - 7

Security - <https://tools.ietf.org/html/rfc4301>

Scanning - <https://tools.ietf.org/html/rfc4301>

Privacy - <https://tools.ietf.org/html/rfc7721>