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BIP: 338
Layer: Peer Services
Title: Disable transaction relay message
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Abstract

This BIP describes a change to the p2p protocol to allow a node to tell a peer that a connection will not be used for transaction relay, to support block-relay-only connections that are currently in use on the network.

Motivation

This proposal is part of an effort to increase the number of inbound connections that a peer can service, by distinguishing peers which will not relay transactions from those that do.

Since 2019, software has been deployed[1] which initiates connections on the Bitcoin network and sets the transaction relay field (introduced by BIP 37 and also defined in BIP 60) to false, to prevent transaction relay from occurring on the connection. Additionally, addr messages received from the peer are ignored by this software.

The purpose of these connections is two-fold: by making additional low-bandwidth connections on which blocks can propagate, the robustness of a node to network partitioning attacks is strengthened. Additionally, by not relaying transactions and ignoring received addresses, the ability of an adversary to learn the complete network graph (or a subgraph) is reduced[2], which in turn increases the cost or difficulty to an attacker seeking to carry out a network partitioning attack (when compared with having such knowledge).

The low-bandwidth / minimal-resource nature of these connections is currently known only by the initiator of the connection; this is because the transaction relay field in the version message is not a permanent setting for the lifetime of the connection. Consequently, a node receiving an inbound connection with transaction relay disabled cannot distinguish between a peer that will never enable transaction relay (as described in BIP 37) and one that will. Moreover, the node also cannot determine that the incoming connection will ignore relayed addresses; with that knowledge a node would likely choose other peers to receive announced addresses instead.

This proposal adds a new, optional message that a node can send a peer when

initiating a connection to that peer, to indicate that connection should not be used for transaction relay for the connection's lifetime. In addition, without a current mechanism to negotiate whether addresses should be relayed on a connection, this BIP suggests that address messages not be sent on links where transaction relay has been disabled.

After this BIP is deployed, nodes could more easily implement inbound connection limiting that differentiates low-resource nodes (such as those sending disabletx) from full-relay peers, potentially allowing for an increase in the number of block-relay-only connections that can be made on the network.

Specification

1. A new disabletx message is added, which is defined as an empty message with message type set to "disabletx".
2. The protocol version of nodes implementing this BIP must be set to 70017 or higher.
3. If a node sets the transaction relay field in the version message to a peer to false, then the disabletx message MAY also be sent in response to a version message from that peer if the peer's protocol version is >= 70017. If sent, the disabletx message MUST be sent prior to sending a verack.
4. A node MUST NOT send the disabletx message if the transaction relay field in the version message is omitted or set to true.
5. A node that has sent or received a disabletx message to/from a peer MUST NOT send any of these messages to the peer:
   (a) inv messages for transactions
   (b) notfound messages for transactions
   (c) getdata messages for transactions
   (d) getdata messages for merkleblock (BIP 37)
   (e) filteradd/filterload/filterclear (BIP 37)
   (f) feefilter (BIP 133)
   (g) mempool (BIP 35)
   (h) tx message
6. It is RECOMMENDED that a node that has sent or received a disabletx message to/from a peer not send any of these messages to the peer:
   (a) addr/getaddr
   (b) addrv2 (BIP 155)
7. The behavior regarding sending or processing other message types is not specified by this BIP.
8. Nodes MAY decide to not remain connected to peers that send this message (for example, if trying to find a peer that will relay transactions).

Compatibility

Nodes with protocol version >= 70017 that do not implement this BIP, and nodes with protocol version < 70017, will continue to remain compatible with

implementing software: transactions would not be relayed to peers sending the disabletx message (provided that BIP 37 or BIP 60 has been implemented), and while periodic address relay may still take place, software implementing this BIP should not be disconnecting such peers solely for that reason.

Disabling address relay is suggested but not required by this BIP, to allow for future protocol extensions that might specify more carefully how address relay is to be negotiated. This BIP's recommendations for software to not relay addresses is intended to be interpreted as guidance in the absence of any such future protocol extension, to accommodate existing software behavior.

Note that all messages specified in BIP 152, including blocktxn and getblocktxn, are permitted between peers that have sent/received a disabletx message, subject to the feature negotiation of BIP 152.

This proposal is compatible with, but independent of, BIP 37.

Implementation

https://github.com/bitcoin/bitcoin/pull/20726

References

1. Bitcoin Core has implemented this functionality since version 0.19.0.1, released in November 2019.
2. For example, see https://www.cs.umd.edu/projects/coinscope/coinscope.pdf and https://arxiv.org/pdf/1812.00942.pdf.

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