Distributed Mobility Management [dmm]
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Privacy considerations for DMM
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Abstract

Recent events have emphasized the importance of privacy in protocol design. This document describes ways in which DMM protocol designs and DMM networks can reduce certain threats to privacy.

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1. Introduction

There have been many recent disclosures about breaches of privacy, and the all-too-frequent news stories about identity theft, credit card services infiltrated, and other serious threats. An extensive IAB discussion about the nature of such breaches is available [RFC6462].

Within the IETF, there has been a greatly increased awareness of how to mitigate these threats by improved protocol design [RFC6973]. One major danger is the dissemination of long-lived identifiers as part of protocol transactions. When a long-lived identifier can be observed in such transactions with disparate applications and servers, a history can be constructed about the person associated with that long-lived identier. Remarkably accurate predications can then be made about the future behavior of that person -- a clear threat to privacy. Notably, such predictions are not at all illegal, and yet most people would consider the ability to make such predictions as an unwanted outcome of using IETF protocols. Similarly, knowledge about the recent history of a person as inferred by tracking a long-lived identifier can provide strong hints about how to analyze the earlier actions (including personal interactions) of that person.

This document details the mechanisms as currently understood within mobility management protocols in order to better avoid perpetuating potential threats to privacy within DMM. As a general rule, trackable information in protocol messages should be avoided as much as possible [RFC4882].

The following mechanisms are discussed.

- Recommend implementation of pseudo-home address feature [RFC5726].
- Source IPv6 address for data packets could be used only for the lifetime of the application used for that address
- MPTCP may be useful for additional protection against traffic analysis
- MNID may contain confidential information. Packets in which the MNID extension contains a confidential identifer should be encrypted.
- MAC randomization, recent Apple announcement

2. Pseudo-home Address

Recommend consideration of using the pseudo-home address feature from RFC 5726[RFC5726]. This has the effect of reducing or eliminating the ability to track the movement events related to a mobile node, which otherwise might be visible to snooping devices located anywhere between the mobile node and home agent.

3. Source IPv6 Address Utilization

Source IPv6 address for data packets could be used only for the lifetime of the application used for that address. For this purpose, each new address can be generated as detailed in [RFC4941].

4. MPTCP

MPTCP [RFC6824] can be used for additional protection against traffic analysis. This can be done by spreading traffic over several associated TCP endpoints, either randomly, or as chosen to emulate traffic patterns for unrelated applications.

5. MNID

MNID [RFC4283] may contain confidential information. Control packets in which the MNID extension contains a confidential identifer should be encrypted. Alternatively, the MN-ID could be generated based on CUI (Chargeable user identity), or some other temporary identifier. In that way, the access network would never have access to the real MN-ID.

6. MAC Randomization

While not under the jurisdiction of the IETF, MAC addresses are often included within IETF protocols. For the purposes of better protecting privacy, there has been much recent discussion about randomization of MAC addresses. As one example, see the recent announcement about Randomized Wi-Fi addresses by Apple Computers [apple-privacy].

Various protocols derived from Mobile IP are designed using certain assumptions related to the use of same MAC address. For example, LMA looks up a MN session using the MN's MAC address. This breaks when the MAC address changes. It is recommended that mobility management protocols reduce or eliminate dependence on MAC addresses. Some specific suggestions include the following:

- Require the MN to present a new MAC address in each access attach.
- Allow MN to present multiple MAC addresses during a single attach.
- Handover keys and other key material should be able to deal with MAC address changes.

7. Non-issues

There are many cases where nonces or cookies are used for temporary use during control signal sequences -- for instance nonces as used with Mobile IP route optimization [RFC6275]. Insofar as these fields are used only temporarily, they are not often useful for tracking user movements. Even so, when the same value is used for a request and returned in a response, a small bit of information is leaked about the status of a protocol transaction. This may not be important, but if so can be averted by encryption.

8. Security Considerations

This document is entirely concerned with raising important security considerations, but does not specify any new protocol that may affect existing security designs.

9. IANA Considerations

This document does not suggest any IANA actions.

10. References

10.1. Normative References

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10.2. Informative References

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