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S. Farrell  
Trinity College Dublin  
H. Tschofenig  
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**Pervasive Monitoring is an Attack**  
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Abstract

Pervasive monitoring is a technical attack that should be mitigated in the design of IETF protocols, where possible.

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## **1. Pervasive Monitoring is a Widespread Attack on Privacy**

Pervasive Monitoring (PM) is widespread (and often covert) surveillance through intrusive gathering of protocol artefacts, including application content, or protocol meta-data such as headers. Active or passive wiretaps and traffic analysis, (e.g., correlation, timing or measuring packet sizes), or subverting the cryptographic keys used to secure protocols can also be used as part of pervasive monitoring.

The IETF community's technical assessment is that PM is an attack on the privacy of Internet users and organizations. PM is distinguished by being indiscriminate and very large-scale, rather than by introducing new types of technical compromise. The IETF community has expressed strong agreement that PM is an attack that needs to be mitigated where possible, via the design of protocols that make PM significantly more expensive or infeasible. Pervasive Monitoring was discussed at the technical plenary of the November 2013 IETF meeting [[IETF88Plenary](#)] and then through extensive exchanges on IETF mailing lists. This document records the IETF community's consensus and establishes the technical nature of PM.

The term "attack" is used here in a technical sense that differs somewhat from common English usage. In common English usage, an attack is an aggressive action perpetrated by an opponent, intended to enforce the opponent's will on the attacked party. The term is used here to refer to behavior that subverts the intent of communicating parties without the agreement of those parties. An attack may change the content of the communication, record the content or external characteristics of the communication, or through correlation with other communication events, reveal information the parties did not intend to be revealed. It may also have other effects that similarly subvert the intent of a communicator. [[RFC4949](#)] contains a more complete definition for the term attack. We also use the term in the singular here, even though PM in reality may require a multi-faceted set of coordinated attacks.

In particular, the term attack, used technically, implies nothing about the motivation of the actor mounting the attack. The motivation for PM is not relevant for this document, but can range from non-targeted nation-state surveillance, to legal but privacy-unfriendly purposes by commercial enterprises, to illegal actions by criminals. The same techniques can be used regardless of motivation. Thus we cannot defend against the most nefarious actors while allowing monitoring by other actors no matter how benevolent some might consider them to be, since the actions required are indistinguishable from other attacks.



## **2. The IETF will work to Mitigate Pervasive Monitoring**

"Mitigation" is a technical term that does not imply an ability to completely prevent or thwart an attack. Protocols that mitigate PM will not prevent the attack, but can significantly change the threat. (See the diagram on page 24 of [RFC 4949](#) for how the terms attack and threat are related.) This can significantly increase the cost of attacking, force what was covert to be overt, or make the attack more likely to be detected, possibly later.

IETF standards already provide mechanisms to protect Internet communications and there are guidelines [[RFC3552](#)] for applying these in protocol design. But those generally do not consider PM, the confidentiality of protocol meta-data, countering traffic analysis nor data minimisation. [[RFC6973](#)] In all cases, there will remain some privacy-relevant information that is inevitably disclosed by protocols. As technology advances, techniques that were once only available to extremely well funded actors become more widely accessible. Mitigating PM is therefore a protection against a wide range of similar attacks.

It is therefore timely to revisit the security and privacy properties of our standards. The IETF will work to mitigate the technical aspects of PM, just as we do for protocol vulnerabilities in general. The ways in which IETF protocols mitigate PM will change over time as mitigation and attack techniques evolve and so are not described here.

Those developing IETF specifications need to be able to describe how they have considered PM, and, if the attack is relevant to the work to be published, be able to justify related design decisions. This does not mean a new "pervasive monitoring considerations" section is needed in IETF documentation. It means that, if asked, there needs to be a good answer to the question "is pervasive monitoring relevant to this work and if so how has it been considered?"

In particular, architectural decisions, including which existing technology is re-used, may significantly impact the vulnerability of a protocol to PM. Those developing IETF specifications therefore need to consider mitigating PM when making these architectural decisions. Getting adequate, early review of architectural decisions including whether appropriate mitigation of PM can be made is important. Revisiting these architectural decisions late in the process is very costly.

While PM is an attack, other forms of monitoring can be beneficial and not part of any attack, e.g. network management functions monitor packets or flows and anti-spam mechanisms need to see mail message



content. Some monitoring can even be part of the mitigation for PM, for example Certificate Transparency [[RFC6962](#)] involves monitoring Public Key Infrastructure in ways that could detect some PM attack techniques. There is though a clear potential for monitoring mechanisms to be abused for PM, so this tension needs careful consideration in protocol design. Making networks unmanageable to mitigate PM is not an acceptable outcome, but ignoring PM would go against the consensus documented here. An appropriate balance will emerge over time as real instances of this tension are considered.

Finally, the IETF, as a standards development organisation, does not control the implementation or deployment of our specifications (though IETF participants do develop many implementations), nor does the IETF standardise all layers of the protocol stack. Moreover, the non-technical (e.g. legal and political) aspects of mitigating pervasive monitoring are outside of the scope of the IETF. The broader Internet community will need to step forward to tackle PM, if it is to be fully addressed.

To summarise: current capabilities permit some actors to monitor content and meta-data across the Internet at a scale never before seen. This pervasive monitoring is an attack on Internet privacy. The IETF will strive to produce specifications that mitigate pervasive monitoring attacks.

### **3. Process Note**

In the past, architectural statements of this sort, e.g., [[RFC1984](#)] and [[RFC2804](#)] have been published as joint products of the Internet Engineering Steering Group (IESG) and the Internet Architecture Board (IAB). However, since those documents were published, the IETF and IAB have separated their publication "streams" as described in [[RFC4844](#)] and [[RFC5741](#)]. This document was initiated by both the IESG and IAB, but is published as an IETF-stream consensus document, in order to ensure that it properly reflects the consensus of the IETF community as a whole.

[[Note (to be removed before publication): This draft is written as if IETF consensus has been established for the text.]]

### **4. Security Considerations**

This document is entirely about privacy. More information about the relationship between security and privacy threats can be found in [[RFC6973](#)]. [Section 5.1.1 of \[\[RFC6973\]\(#\)\]](#) specifically addresses surveillance as a combined security-privacy threat.



## 5. IANA Considerations

There are none. We hope the RFC editor deletes this section before publication.

## 6. Acknowledgements

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#### Authors' Addresses

Stephen Farrell  
Trinity College Dublin  
Dublin, 2  
Ireland

Phone: +353-1-896-2354  
Email: [stephen.farrell@cs.tcd.ie](mailto:stephen.farrell@cs.tcd.ie)

Hannes Tschofenig  
Brussels,  
Belgium

Phone:  
Email: [hannes.tschofenig@gmx.net](mailto:hannes.tschofenig@gmx.net)

