Network Working Group
Request for Comments: 3594
Category: Standards Track

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September 2003

PacketCable Security Ticket Control Sub-Option for the DHCP CableLabs Client Configuration (CCC) Option

Status of this Memo

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Abstract

This document defines a new sub-option for the DHCP CableLabs Client Configuration (CCC) Option. This new sub-option will be used to direct CableLabs Client Devices (CCDs) to invalidate security tickets stored in CCD non volatile memory (i.e., locally persisted security tickets).

1. Conventions used in this document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14, RFC 2119 [2].

2. Terminology

Definitions of terms/acronyms used throughout this document:

CCC - CableLabs Client Configuration option, described in [1].

CCD - CableLabs Client Device. A PacketCable MTA is an example of a CCD.

STC - Security Ticket Control. The CCC sub-option described in this document.

MTA - Media Terminal Adapter. The CCD specific to the PacketCable architecture.

PacketCable - multimedia architecture developed by CableLabs. See [8] for full details.

3. Introduction

The CableLabs Client Configuration Option [1] defines several sub-options used to configure devices deployed into CableLabs architectures. These architectures implement the PacketCable Security Specification [4] (based on Kerberos V5 [5]), to support CCD authentication and establishment of security associations between CCDs and application servers.

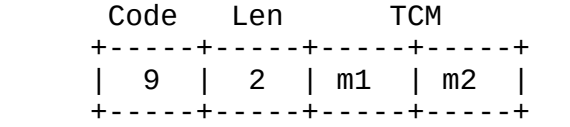
CCDs are permitted to retain security tickets in local persistent storage. Thus a power-cycled CCD is enabled to avoid expensive ticket acquisition for locally persisted, non-expired tickets. This feature greatly reduces the security overhead of a deployment.

This sub-option allows the service provider to control the lifetime of tickets persisted locally on a CCD. The service provider requires this capability to support operational functions such as forcing re-establishment of security associations, remote testing, and remote diagnostic of CCDs.

It should be noted that, although based on the Kerberos V5 RFC [5], the PacketCable Security Specification is not a strict implementation of this RFC. See [4] for details of the PacketCable Security Specification.

4. Security Ticket Control Sub-option

This sub-option defines a Ticket Control Mask (TCM) that instructs the CCD to validate/invalidate specific application server tickets. The sub-option is encoded as follows:



The length MUST be 2. The TCM field is encoded as an unsigned 16 bit quantity per network byte order. Each bit of the TCM is assigned to a specific server or server group. A bit value of 0 means the CCD MUST apply normal invalidation rules (defined in [4]) to the locally

persisted ticket for the server/server group. A bit value of 1 means the CCD MUST immediately invalidate the locally persisted ticket for the server/server group.

Bit #0 is the least significant bit of the field. The bit positions are assigned as follows:

Bit #0 - the PacketCable Provisioning Server used by the CCD.

Bit #1 - the group of all PacketCable Call Management Servers used by the CCD.

Bit #2 - #15. Reserved and MUST be set to 0.

If a CCD does not locally store tickets, it MUST ignore this sub-option. Bit values not known to the CCD MUST be ignored.

5. IANA Considerations

IANA has assigned a sub-option code to this sub-option from the "CableLabs Client Configuration" sub-option number space (maintained within the BOOTP-DHCP Parameters Registry).

IANA has also set-up a new registry and will maintain a new number space of "CableLabs Client Configuration Option Ticket Control Mask Bit Definitions", located in the BOOTP-DHCP Parameters Registry. The initial bit definitions are described in section 4 of this document. IANA will register future bit mask definitions via an "IETF Consensus" approval policy as described in RFC 2434 [3].

6. Security Considerations

Potential DHCP protocol attack exposure is discussed in section 7 of the DHCP protocol specification [6] and in Authentication for DHCP Messages [7]. Additional CCC attack exposure is discussed in [1].

The STC sub-option could be used to disrupt a CableLabs architecture deployment. In the specific case of PacketCable [8], a deployment could be disrupted if a large number of MTAs are reset/power cycled, initiate their provisioning flow [9], and are instructed by a malicious DHCP server to invalidate all security tickets. This could lead to a Denial of Service (DoS) condition as this large set of MTAs simultaneously attempt to authenticate and obtain tickets from the security infrastructure.

However, the scenario described above is unlikely to occur. Within the cable delivery architecture required by the various CableLabs projects, the DHCP client is connected to a network through a cable

modem and the CMTS (head-end router). The CMTS is explicitly configured with a set of valid DHCP server addresses to which DHCP requests are forwarded. Further, a correctly configured CMTS will only allow DHCP downstream traffic from specific DHCP server addresses.

It should be noted that the downstream filtering of DHCP packets will not prevent spoofed DHCP servers behind the CMTS, but the network infrastructure behind the CMTS is assumed to be closely controlled by the service provider.

7. Intellectual Property Statement

8. References

8.1. Normative

[1] Beser, B. and P. Duffy, "DHCP Option for CableLabs Client Configuration", RFC 3495, March 2003.

[2] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[3] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", RFC 2434, October 1998.

[4] "PacketCable Security Specification", PKT-SP-SEC-I09-030728, http://www.packetcable.com/downloads/specs/PKT-SP-SEC-I09-030728.pdf

8.2. Informative

[5] Kohl, J. and C. Neuman, "The Kerberos Network Authentication Service (V5)", RFC 1510, September 1993.

[6] Droms, R., "Dynamic Host Configuration Protocol", RFC 2131, March 1997.

[7] Droms, R. and W. Arbaugh, "Authentication for DHCP Messages", RFC 3118, June 2001

[8] "PacketCable 1.0 Architecture Framework Technical Report", PKT-TR-ARCH-V01-991201, http://www.packetcable.com/downloads/specs/pkt-tr-arch-v01-991201.pdf

[9] "PacketCable MTA Device Provisioning Specification", PKT-SP-PROV-I07-030728, http://www.packetcable.com/downloads/specs/PKT-SP-PROV-I07-030728.pdf

9. Acknowledgments

The author would like to acknowledge the effort of all those who contributed to the development of the PacketCable Provisioning specifications:

Sumanth Channabasappa (Alopa Networks); Angela Lyda, Rick Morris, Rodney Osborne (Arris Interactive); Steven Bellovin and Chris Melle (AT&T); Eugene Nechamkin (Broadcom); John Berg, Maria Stachelek, Matt Osman, Venkatesh Sunkad (CableLabs); Klaus Hermanns, Azita Kia, Michael Thomas, Paul Duffy (Cisco); Deepak Patil (Com21); Jeff Ollis, Rick Vetter (General Instrument/Motorola); Roger Loots, David Walters (Lucent); Peter Bates (Telcordia); Patrick Meehan (Tellabs); Satish Kumar, Itay Sherman, Roy Spitzer (Telogy/TI), Aviv Goren (Terayon); Prithivraj Narayanan (Wipro), and Burcak Beser (Juniper Networks).

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11. Full Copyright Statement

Acknowledgement

Funding for the RFC Editor function is currently provided by the Internet Society.