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DHCP Option for PacketCable VoIP Client Configuration

Status of this Memo

1. Abstract

The Voice over IP work carried over in the PacketCable project conducted by CableLabs. The configuration of the PacketCable Voice over IP client is achieved using DHCP messaging.

This document contains the definition of the PacketCable VoIP Client configuration option.

2. 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 RFC-2119 [2].

3. DHCP Terminology

o "DHCP client"

A DHCP client or "client" is an Internet host using DHCP to obtain configuration parameters such as a network address.

o "DHCP server"

A DHCP server of "server"is an Internet host that returns configuration parameters to DHCP clients.

o "binding"

A binding is a collection of configuration parameters, including at least an IP address, associated with or "bound to" a DHCP client. Bindings are managed by DHCP servers.

4. Introduction

PacketCable is a project conducted by Cable Television Laboratories, Inc. (CableLabs) and its member companies aimed at identifying, qualifying, and supporting Internet-based voice and video products over cable systems. These products will represent new classes of services utilizing cable-based packet communication networks. New service classes include telephone calls and videoconferencing over cable networks and the Internet. The services would be delivered using the basic Internet Protocol (IP) technology that is used to send data via the Internet.

The PacketCable embedded-MTA (MTA) is a single physical device with dual personality: a Cable Modem (CM) and a VoIP device. Both of these devices are administered by different entities. Both of the personalities have different IP addresses and different IP configurations.

PacketCable project produced specifications of VoIP elements, which can be found in www.packetcable.com. The PacketCable VoIP Client uses DHCP for configuration. Due to specific needs of PacketCable client a new DHCP option is needed. The new option is designed to have a number of sub-information, which is laid down in DHCP option fashion [3].

5. PacketCable VoIP Client Configuration Option

The code for this option is TBD.

The PacketCable VoIP Client Configuration option is used by the PacketCable VoIP clients to identify a list of valid PacketCable specific network servers.

The option sub-fields contain information regarding these servers.

The option is included in DHCP OFFER-s, and is laid out as depicted below:

```
-------------------------------------------------------------
| TBD | Length | Subfield 1 | Subfield 2 | ... | Subfield n |
-------------------------------------------------------------
```

Each sub-field is in the form of:


```
-------------------------------------------------
| Sub-field Number | Length | Subfield information |
-------------------------------------------------
```

Each sub-field of the PacketCable VoIP Client Configuration identifies a particular type of PacketCable server. Sub-fields 1 and 2 identify the primary and secondary PacketCable network DHCP servers, sub-field 3 identifies the PacketCable service provider's SNMP entity, and sub-fields 4 and 5 identify the primary and secondary PacketCable network DNS servers. The Sub-fields are summarized below:

Option	Sub-field	Description and Comments
TBD	1	Telephony Service Provider Primary DHCP Server Address
	2	Telephony Service Provider Secondary DHCP Server Address
	3	Telephony Service Provider SNMP Server Address
	4	Telephony Service Provider Network Primary Domain Name Server Address
	5	Telephony Service Provider Network Secondary Domain Name Server Address

6. PacketCable VoIP Client option Sub-field Definitions

The following parts provide detailed descriptions of each sub-field of DHCP PacketCable VoIP Client option. Note that UDP port numbers are normally standard values as defined in [4]. The port numbers MAY be omitted, if the standard protocol ports are to be used as

defined in [4]. E.g.:the standard DNS UDP port number is 42/udp. If non-standard port numbers are used, these MUST be appended as shown below.

6.1. Telephony Service Provider's DHCP Server Address

The Telephony Service Provider's (TSP) DHCP Server Address identifies the DHCP server that will be used to obtain an MTA-unique IP address for a given telephony service provider's network administrative domain.

Sub-field 1 is the address of the network's primary Telephony Service Provider DHCP server IP Address. Sub-field 2 is the address of the network's secondary Telephony Service Provider DHCP server. Sub-field 2 MAY be specified to identify a redundant or backup DHCP server.

The encoding syntax for sub-field 1 and sub-field 2 is as follows:

Sub-field	Value	Description and Comments
1	[x.y.z.y]:port	IP address of Primary TSP DHCP Server The port number is to be used only if different than the default port number is to be used.
2	[x.y.z.y]:port	IP address of Secondary TSP DHCP Server The port number is to be used only if different than the default port number is to be used.

6.2. Telephony Service Provider's SNMP Entity Address

The Telephony Service Provider's SNMP Entity Address is the network address of the default server for a given telephony service provider's network administrative domain. The Telephony Service Provider's SNMP Entity Address component MUST be capable of accepting SNMP traps. This address can be configured as either an FQDN or as an IPv4 address.

The encoding of sub-field 3 is as follows:

Sub-field	Value	Description and Comments

	3	[x.y.z.y]:port FQDN:port	Either the IP address or the FQDN will be configured. The port number is to be used only if different than the default port number is to be used.

6.3. DNS system

The Telephony Service Provider's DNS server is required to resolve a PacketCable device's FQDN into an IPv4 address. The DNS server's address MUST be specified in the IPv4 format.

Sub-field 4 is the address of the network's primary DNS server IP Address. Sub-field 5 is the address of the network's secondary DNS server. Sub-field 5 MAY be specified to identify a redundant or backup DNS server.

The encoding syntax for sub-field 4 and sub-field 5 is as follows:

Sub-field	Value	Description and Comments
4	[x.y.z.y]:port	IP address of Primary TSP DNS Server The port number is to be used only if different than the default port number is to be used.
5	[x.y.z.y]:port	IP address of Secondary TSP DNS Server The port number is to be used only if different than the default port number is to be used.

6.4. Procedure for adding call control server types

A vendor may add a new sub-field by issuing an internet draft that contains the new sub-field. The new sub-field code MUST be labeled "TBD." This draft will then be submitted to the DHC working group, and, if accepted for inclusion in the DHCP specification, a sub-option field code is assigned and the sub-option specification will be published as an RFC, which will update this RFC.

6.5 Typical us of PacketCable VoIP Client Configuration option

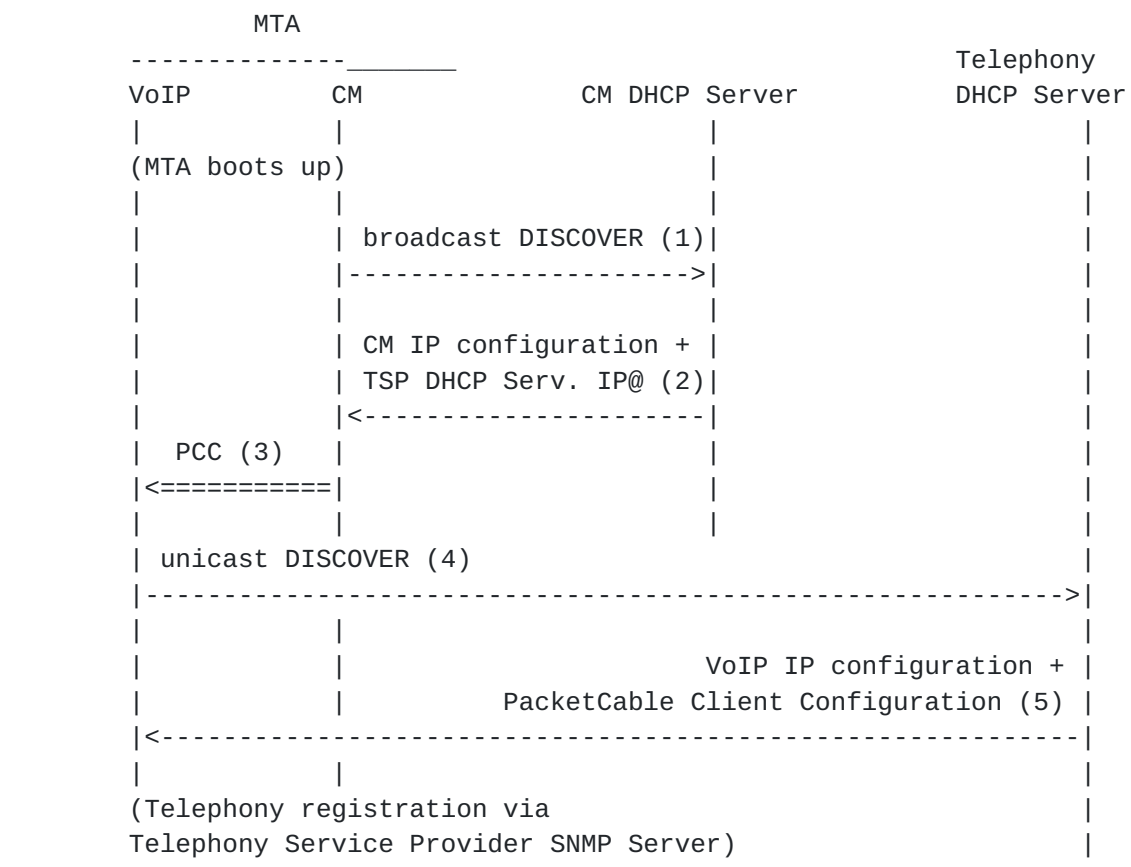

Figure 1 Typical MTA IP Configuration via DHCP

The PacketCable VoIP Client Configuration option is used on the DHCP messaging of both CM and VoIP device personalities. A typical MTA boot operation is depicted in Figure 1 and can be described as below:

1. When MTA boots the CM personality sends a broadcast DISCOVER message with proper Vendor Client Identifier Option.

2. The DHCP server gives a proper address from CM IP address pool, along with the PacketCable VoIP Client Configuration Option populated with (at least) Telephony Service Provider DHCP Server IP address(es).

3. The CM passes the PacketCable Client Configuration (PCC) information to VoIP device.

4. The VoIP device uses the information in the Telephony Service Provider IP DHCP Server Address field and unicasts the DISCOVER message to the address(es).

5. Telephony Service Provider IP DHCP Server returns the IP configuration for VoIP personality and PacketCable Client Configuration information.

From this point on the MTA uses the FQDN information for PacketCable SNMP server using Telephony Service Provider DNS servers, and registers for service.

7. Security Considerations

This draft relies on DHCP protocol [5] for authentication and security, i.e. it does not provide either in excess of what DHCP is (or will be) providing.

9. References

1. Bradner, S., "The Internet Standards Process -- Revision 3", BCP 9, RFC 2026, October 1996.

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

3. Alexander, S. and R. Droms, "DHCP Options and BOOTP Vendor Extensions", RFC-2132, March 1997.

4. Reynolds, J., Postel, J., _ASSIGNED NUMBERS_, RFC 1340, July 1992.

5. Droms, R., "Dynamic Host Configuration Protocol", RFC-2131, March 1997.

10. Acknowledgments

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