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DHCP Options for Broadcast and Multicast Control Servers
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Abstract

This document defines new options to discover the Broadcast and Multicast Service (BCMCS) controller in an IP network. BCMCS is being developed for 3rd generation (3G) cellular telephone networks. Users of the service interact with a controller in the network via the Mobile Node (MN) to derive information required to receive

Internet-Draft

September 2005

broadcast and multicast service. Dynamic Host Configuration Protocol can be used to configure the MN to access a particular controller. This document defines the related options and option codes.

Table of Contents

| | | |
|---------------------|--|--------------------|
| 1. | Motivation | 3 |
| 2. | Overview of the 3GPP2 BCMCS Network | 4 |
| 3. | Terminology | 5 |
| 4. | Broadcast & Multicast Service Controller Options | 6 |
| 4.1 | Broadcast & Multicast Service Controller Domain Name list for DHCPv4 | 6 |
| 4.2 | Broadcast & Multicast Service Controller Domain Name List Option for DHCPv6 | 7 |
| 4.3 | Broadcast & Multicast Service Controller IPv4 address option for DHCPv4 | 7 |
| 4.4 | Broadcast & Multicast Service Controller IPv6 Address Option for DHCPv6 | 8 |
| 4.5 | Consideration for Client Operation | 9 |
| 4.6 | Consideration for Server Operation | 9 |
| 5. | Security Considerations | 11 |
| 6. | IANA Considerations | 12 |
| 7. | Acknowledgements | 13 |
| 8. | Normative References | 13 |
| | Authors' Addresses | 13 |
| | Intellectual Property and Copyright Statements | 15 |

Internet-Draft

September 2005

1. Motivation

Dynamic Host Configuration Protocol [[RFC2131](#)] and [[RFC3315](#)] can be used to configure various non-IP address type of parameters. These parameters are required for normal operation of various services that are offered over an IP network.

Broadcast and multicast service (BCMCS) is one such service that is being standardized in various mobile wireless standard bodies such as 3GPP2, OMA, and 3GPP. A description of the BCMCS as defined in 3GPP2 can be found in [[BCMCS](#)].

While DHCP already defines many options for device configuration, no option exists for configuring a mobile device to use BCMCS. This memo defines extensions for both DHCPv4 and DHCPv6 so that DHCP can be used to provide necessary configuration information to a mobile device about the BCMCS controllers.

DHCP is being used in 3GPP2, to assist mobile nodes (MN) with the discovery of the BCMCS Controller in a mobile operator's IP network. The BCMCS includes a controller component that is responsible for managing the service via interaction with the MN and other network entities. In this document we will call this a BCMCS controller.

An overview of the 3GPP2 BCMCS architecture is given in the next section. It provides enough information to understand the basics of the 3GPP2 BCMCS operation. Readers are encouraged to find a more detailed description in [[BCMCS](#)].

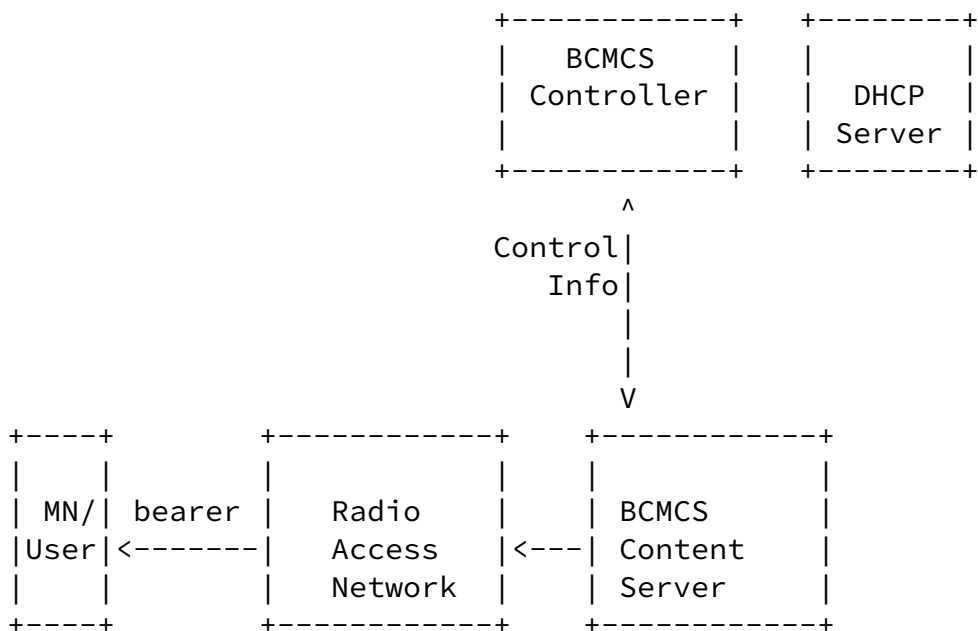
As described in [[BCMCS](#)], the MNs are required to know the IPv4 or the IPv6 address of the BCMCS controller entity so that they can download all the necessary information about a desired broadcast and/or a multicast program. In a roaming environment static configuration of the BCMCS controller's IP address becomes unrealistic. Therefore, DHCP is considered to be a method to dynamically configure the MNS with the IP address or the fully qualified domain name of the BCMCS

controller in the 3G cellular telephone networks.

In order to allow the MNs to discover the BCMCS controllers, the MNs request the appropriate option codes from the DHCP server. The DHCP servers need to return the corresponding configuration options that carry either BCMCS controller's IP address or fully qualified domain name based on configuration. This document defines the necessary options and option codes.

2. Overview of the 3GPP2 BCMCS Network

The Broadcast and Multicast Service architecture in a 3G cellular telephone network such as 3GPP2 has the following model:



Note that this figure is shown here for a basic understanding of how Broadcast and Multicast service works in a 3G cellular telephone network. The network elements except MN/user and the DHCP server are

not relevant to the text in this document.

The MN interacts with the BCMCS Controller to request broadcast/multicast program information from the network (e.g., scheduled time, multicast IP address, port numbers). The MN may also be authenticated by the BCMCS Controller while downloading the relevant program security related information (such as encryption key). These interactions may happen via HTTP and XML as defined in [\[BCMCS\]](#). There may be more than one BCMCS controller in the network. The MN should discover the appropriate BCMCS controller to request the relevant program information. For details of Broadcast and Multicast Service operation in 3GPP2, see [\[BCMCS\]](#).

[3.](#) Terminology

The keywords "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](#).

[4.](#) Broadcast & Multicast Service Controller Options

This section defines the configuration option for the BCMCS controller of the broadcast and multicast service.

[4.1](#) Broadcast & Multicast Service Controller Domain Name list for DHCPv4

The general format of the BCMCS Controller Domain list option for DHCPv4 is as follows:

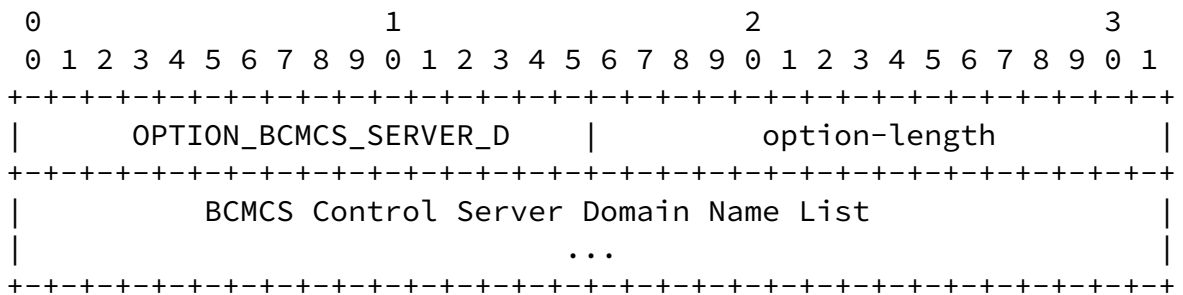
| Code | Len | FQDN(s) of BCMCS Controller |
|--------|--------|--|
| +----- | +----- | +-----+-----+-----+-----+-----+-----+----- |

+-----+-----+-----+-----+-----+-----+

4.2 Broadcast & Multicast Service Controller Domain Name List Option for DHCPv6

The semantics and content of the DHCPv6 encoding of this option is exactly the same as the encoding described in the previous section, other than necessary differences between the way options are encoded in DHCPv4 and DHCPv6.

Specifically, the DHCPv6 option for the BCMCS Control Server Domain Names has the following format:



option-code: OPTION_BCMCS_SERVER_D (TBD2).

option-length: Length of the 'BCMCS Control Server Domain Name List' field in octets; variable.

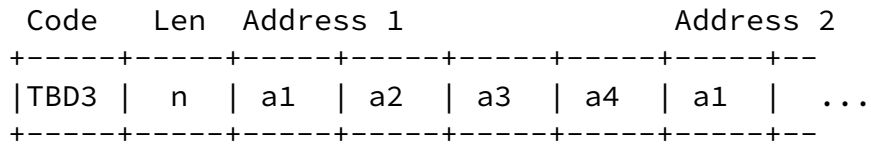
BCMCS Control Server Domain Name List: Identical format as in [Section 4.1](#) (except the Code and Len fields).

4.3 Broadcast & Multicast Service Controller IPv4 address option for DHCPv4

The Length byte (Len) is followed by a list of IPv4 addresses

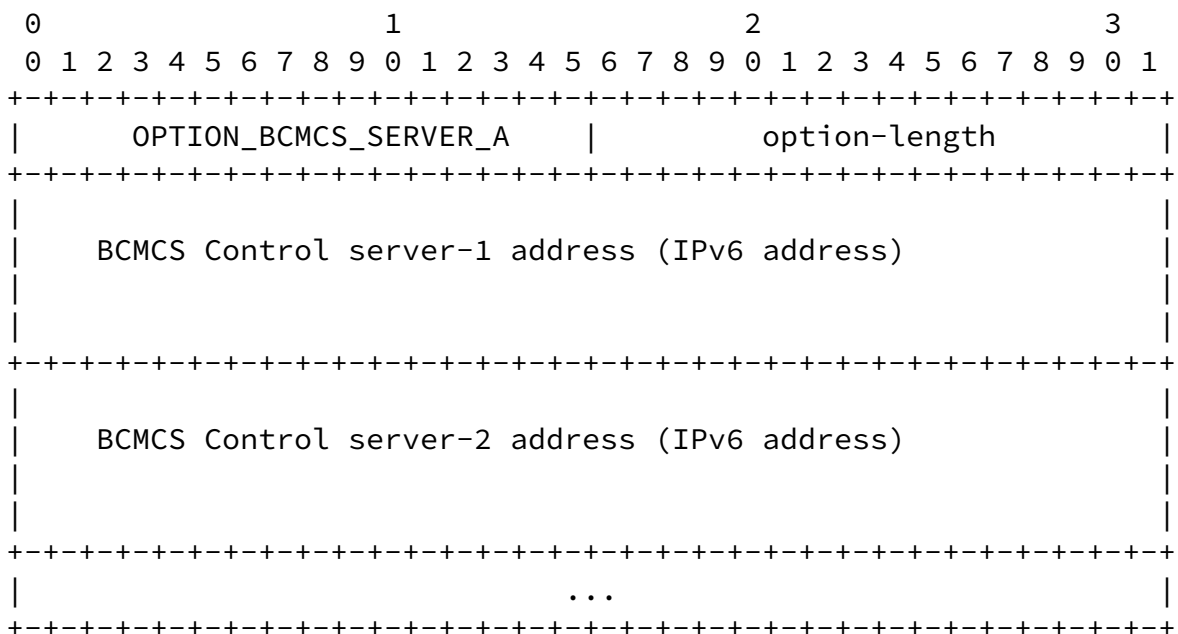
indicating BCMCS controller IPv4 addresses. The BCMCS controllers

MUST be listed in order of preference. Its minimum length is 4, and the length MUST be a multiple of 4. The DHCPv4 option for this encoding has the following format:



4.4 Broadcast & Multicast Service Controller IPv6 Address Option for DHCPv6

This DHCPv6 option MUST carry one or more 128-bit IPv6 address(es) of the BCMCS Controller in a operator's network.



option-code: OPTION_BCMCS_SERVER_A (TBD4).

option-length: Length of the 'BCMCS Control Server IPv6 address' field in octets; variable.

[4.5](#) Consideration for Client Operation

For DHCPv4, the client MAY request either or both of the BCMCS Controller Domain Name List and the IPv4 Address options in the Parameter Request List option (code 55) as defined in [[RFC2132](#)].

For DHCPv6, the client MAY request either or both of the BCMCS Controller Domain Name List and the IPv6 Address options in the Options Request Option (ORO) as described in [[RFC3315](#)].

If the client receives both the BCMCS Controller Domain Name List and IPv6 or IPv4 Address options, it SHOULD use the Domain Name List option. In this case, the client SHOULD NOT use the BCMCS Controller IPv6 or IPv4 Address option unless the server(s) in the BCMCS Controller Domain Name List can not be resolved or reached.

[4.6](#) Consideration for Server Operation

A server MAY send a client either the BCMCS Controller Domain Name List Option or the BCMCS Controller IPv6 Address/IPv4 Address options if the server is configured to do so.

If a client requests both the options and the server is configured with both types of information, the server MAY send the client only one of the options if it is configured to do so. In this case the server SHOULD send the BCMCS Controller Domain Name List option.

A server configured with the BCMCS Controller IPv6 or IPv4 Address information MUST send a client the BCMCS Controller IPv6 or IPv4 Address option if that client requested only the BCMCS Controller IPv6 or IPv4 address option and not the BCMCS Controller Domain Name List option in the ORO or Parameter Request List option.

If a client requests for the BCMCS Controller IPv6 or IPv4 Address option and the Server is configured only with the domain name(s), the Server MUST return the Domain Name List and vice versa.

The domain names MUST be concatenated and encoded using the technique described in [section 3.3](#) of "Domain Names - Implementation And Specification" [[RFC1035](#)]. DNS name compression MUST NOT be used.

The following table summarizes the server's response:

Internet-Draft

September 2005

| Client sends in ORO/ Parameter Request List | Domain Name List | IPv6/IPv4 Address |
|--|------------------|-------------------|
| ----- | | |
| Neither option | SHOULD | MAY |
| Domain Name List | MUST | MAY |
| IPv6/IPv4 Address | MAY | MUST |
| Both options | SHOULD | MAY |

Internet-Draft

September 2005

[5.](#) Security Considerations

This document does not introduce any new security concerns beyond those specified in the basic DHCP [[RFC2131](#)] and DHCPv6 [[RFC3315](#)] specifications. In the absence of message integrity protection for these options, an attacker could modify the option values to divert requests for broadcast service.

6. IANA Considerations

The following option codes for Broadcast & Multicast Service Controller option must be assigned by IANA:

1. The BCMCS Controller Domain Name list ([section 4.1](#)) has been assigned a value of TBD1 from the DHCPv4 option space.
2. The BCMCS Controller Domain Name list ([section 4.2](#)) has been assigned a value of TBD2 from the DHCPv6 option space, and a name of OPTION_BCMCS_SERVER_D.
3. The BCMCS Controller IPv4 address option ([section 4.3](#)) has been assigned a value of TBD3 from the DHCPv4 option space.
4. The BCMCS Controller IPv6 address option ([section 4.4](#)) has been assigned a value of TBD4 from the DHCPv6 option space, and a name of OPTION_BCMCS_SERVER_A.

Internet-Draft

September 2005

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