DHCP Protocol Modules for TTCN-3 Toolset with TITAN, Function Specification

Endre Kulcsár

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How to Read This Document

This is the Function Specification for the set of DHCP protocol modules. DHCP protocol modules are developed for the TTCN-3 Toolset with TITAN.

Scope

The purpose of this document is to specify the content of the DHCP protocol modules.

General

Protocol modules implement the message structures of the related protocol in a formalized way, using the standard specification language TTCN-3. This allows defining of test data (templates) in the TTCN-3 language [3] and correctly encoding/decoding messages when executing test suites using the TITAN TTCN-3 test environment.

Protocol modules are using TITAN's RAW encoding attributes [4] and hence are usable with the TITAN test toolset only.

Functional Specification

Protocol Version Implemented

This set of protocol modules implements protocol messages and constants of the DHCP protocol, (see [1], [2], [5], [6] and [7]) with the modifications specified in Modifications/Deviations Related to the Protocol Specification5

Modifications/Deviations Related to the Protocol Specification

Implemented Messages

The following messages are implemented from [1]:

- `BOOTREQUEST`
- `BOOTREPLY`

The following options are implemented from [2]:

- `DHCP_PADDING_OPTION`
- `DHCP_END_OPTION`
- `DHCP_Message_Type_OPTION`

- DHCP_Client_Identifier_OPTION
- DHCP_Requested_IP_Address_OPTION
- DHCP_Host_Name_OPTION
- DHCP_Vendor_class_identifier_OPTION
- DHCP_Parameter_request_list_OPTION
- DHCP_User_Class_Information_OPTION
- DHCP_Server_Identifier_OPTION
- DHCP_IP_Address_Lease_Time_OPTION
- DHCP_Subnet_Mask_OPTION
- DHCP_Domain_Name_OPTION
- DHCP_Router_OPTION
- DHCP_Domain_Name_Server_OPTION
- DHCP_NetBIOS_over_TCP_IP_Name_Server_OPTION
- DHCP_NetBIOS_over_TCP_IP_Node_Type_OPTION
- DHCP_NetBIOS_over_TCP_IP_Scope_OPTION
- DHCP_Perform_Router_Discovery_OPTION
- DHCP_Static_Route_OPTION
- DHCP_Vendor_Specific_Information_OPTION
- DHCP_Maximum_DHCP_Message_Size_OPTION
- DHCP_Time_Offset_OPTION
- DHCP_Time_Server_OPTION
- DHCP_Name_Server_OPTION
- DHCP_Log_Server_OPTION
- DHCP_Cookie_Server_OPTION
- DHCP_LPR_Server_OPTION
- DHCP_Impress_Server_OPTION
- DHCP_Resource_Location_Server_OPTION
- DHCP_Boot_File_Size_OPTION
- DHCP_Merit_Dump_File_OPTION
- DHCP_Swap_Server_OPTION
- DHCP_Root_Path_OPTION
- DHCP_Extension_Path_OPTION
- DHCP_IP_Forwarding_Enable_Disable_OPTION
- DHCP_Non_Local_Source_Routing_Enable_Disable_OPTION
- DHCP_Policy_Filter_OPTION
- DHCP_Maximum_Datagram_Reassembly_Size_OPTION
- DHCP_Default_IP_Time_To_Live_OPTION
- DHCP_Path_MTU_Aging_Timeout_OPTION
- DHCP_Path_MTU_Plateau_Table_OPTION
- DHCP_Interface_MTU_OPTION
- DHCP_All_Subnets_Are_Local_OPTION
- DHCP_Broadcast_Address_OPTION

- DHCP_Perform_Mask_Discovery_OPTION
- DHCP_Mask_Supplier_OPTION
- DHCP_Router_Solicitation_Address_OPTION
- DHCP_Trailer_Encapsulation_OPTION
- DHCP_ARP_Cache_Timeout_OPTION
- DHCP_Ethernet_Encapsulation_OPTION
- DHCP_TCP_Default_TTL_OPTION
- DHCP_TCP_Keepalive_Interval_OPTION
- DHCP_TCP_Keepalive_Garbage_OPTION
- DHCP_Network_Information_Service_Domain_OPTION
- DHCP_Network_Information_Servers_OPTION
- DHCP_Network_Time_Protocol_Servers_OPTION
- DHCP_NetBIOS_Over_TCP_IP_Datagram_Distribution_OPTION
- DHCP_X_Window_System_Font_Server_OPTION
- DHCP_X_Window_System_Display_Manager_OPTION
- DHCP_Network_Information_Service_and_Domain_OPTION
- DHCP_Network_Information_Service_and_Servers_OPTION
- DHCP_Mobile_IP_Home_Agent_OPTION
- DHCP_Simple_Mail_Transport_Protocol_OPTION
- DHCP_Post_Office_Protocol_OPTION
- DHCP_Network_News_Transport_Protocol_OPTION
- DHCP_Default_World_Wide_Web_OPTION
- DHCP_Default_Finger_Service_OPTION
- DHCP_Default_Internet_Relay_Chat_OPTION
- DHCP_Street_Talk_Server_OPTION
- DHCP_Street_Talk_Directory_Assistance_Server_OPTION
- DHCP_Option_Overload_OPTION
- DHCP_TFTP_Server_Name_OPTION
- DHCP_Bootfile_Name_OPTION
- DHCP_Message_OPTION
- DHCP_Renewal_Time_Value_OPTION
- DHCP_Rebinding_Time_Value_OPTION

The following option is implemented from [5]:

- DHCP_Relay_Agent_Information_OPTION

The following option is implemented from [6]:

- DHCP_Classless_Route_OPTION

The following option is implemented from [7]:

- DHCP_Subnet_Selection_OPTION

Protocol Modifications/Deviations

Protocol modules contain the following additions:

`DHCP_GENERAL_OPTION` :
This implements the general `TLV` format of the `DHCP` option

The `DHCP_OPTION_OVERLOAD_OPTION` is not supported. Although this option is decoded correctly, the Enc/Dec functions do not interpret it, i.e. `sname` and `file` fields are decoded as charstrings.

Encoding/Decoding and Other Related Functions

This product also contains encoding/decoding functions that assure correct encoding of messages when sent from TITAN and correct decoding of messages when received by TITAN. Implemented encoding/decoding functions:

Name	Type of formal parameters	Type of return value
`enc_PDU_DHCP`	PDU_DHCP	octetstring
`dec_PDU_DHCP`	octetstring	PDU_DHCP
`dec_PDU_DHCP_Opt82`	octetstring, DHCP_Option82_Format	PDU_DHCP

Terminology

No specific terminology is used.

Abbreviations

DHCP

Dynamic Host Configuration Protocol

TLV

Type, Length, Value

TTCN-3

Testing and Test Control Notation version 3

References

[1] RFC 2131
Dynamic Host Configuration Protocol

[2] RFC 2132
DHCP Options and BOOTP Vendor Extensions

[3] ETSI ES 201 873-1 v.2.2.1 (02/2003)
The Testing and Test Control Notation version 3. Part 1: Core Language

[4] Programmer’s Technical Reference for the TITAN TTCN-3 Test Executor

[5] RFC 3046
DHCP Relay Agent Information Option

[6] RFC 3442
The Classless Static Route Option for Dynamic Host Configuration Protocol (DHCP) version 4

[7] RFC 3011
The IPv4 Subnet Selection Optionfor DHCP