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DHCP options

This article describes in some detail how to setup the automatic DHCP option assignment and provisioning of Infoblox IPAM infrastructures. Before continuing familiarize yourself with the IPAM / DHCP update tool and IPAM Tree setup.

IPAM tree option list

For "network" and "scope" objects, the column **Dhcp_options** of the table **NMS.Dhcp_tree** can be used to add a series of DHCP option numbers. Each required option is simply added to the list using a comma as separator.

A simple example is shown below. In this case, most options are assigned to the "network" rather than the "scope". This is a design choice since scopes can inherit the options from higher tiered objects.

The values in the **Features** list will in conjunction with the Client-specific information in the table **NMS.Dhcp_clients** determine the values used for each of the DHCP options.

Net_tier	Net_index	Net_type	Net_name	Scope_start	Scope_end	Dhcp_options	Features
0		container	Supernet				
1		container	Users				
2	0	net	Users			1,15,44,46,51	ddns,domain2
3	0	scope	Users	0.0.0.6	0.0.0.126	3	vlan_odd(dhcpsrv1,dhcpsrv2)
2	1	net	Users			1,15,44,46,51	ddns,domain2
3	1	scope	Users	0.0.0.6	0.0.0.126	3	vlan_odd(dhcpsrv1,dhcpsrv2)
2	2	net	Users			1,15,44,46,51	ddns,domain2
3	2	scope	Users	0.0.0.6	0.0.0.126	3	vlan_odd(dhcpsrv1,dhcpsrv2)
2	3	net	Users			1,15,44,46,51	ddns,domain2
3	3	scope	Users	0.0.0.6	0.0.0.126	3	vlan_odd(dhcpsrv1,dhcpsrv2)

A wide range op DHCP options exist. Due to their variety in function and arguments, only a limited set is currently supported. Adding support for additional options is relatively simple, but requires some coding by our developers. Support requests are welcome though.

Option #	Option name
1	subnet-mask
3	routers
6	domain-name-servers
15	domain-name
43	vendor-encapsulated-options
44	netbios-name-servers
46	netbios-node-type
51	lease-time
51a	lease-time (alternative rule set)
60	vendor-class-identifier
150	TFTP-Servers (exists as custom option 150 in DHCP option space)
150a	TFTP-Servers (exists as custom option 150 in DHCP option space, alternative rule set)

Option #	Option name
241	WLC-Servers (exists as custom option 241 in WiFi option space)

DHCP Client table

Many of the values used in the various DHCP options are Client specific. The Table
NMS.Dhcp_clients is the table where for each Client an entry is needed with the desired values for
the DHCP options used in its supernet trees before IPAM/DHCP provisioning can succeed.

This Dhcp_client table has 14 columns to determine the required values for specific DHCP options.
Since each option has its own set of rules and dependencies, they will be discussed separately below.

A sample set of rows form this table:

ClientCode	Lease_time	Ddns_enable	Dhcpsrv1_feature	Dhcpsrv2_feature	Domain1_feature	Domain2_feature	Domain3_feature	Lease1_feature	Lease2_feature	Dns_pri	Dns_sec	Dns_tert	Wins_pri	Wins_sec
DataCenter	28800	1	10.33.44.122	10.33.44.58	acme.com	ins.acme.com	acme.com	28800	14400	10.22.1.64	10.11.1.64			
CN_NY	691200	0	10.33.44.26	10.33.44.58	aCN_NY.acme.com	acme.com	aCN_NY.acme.com	691200	3600	10.22.1.64	10.11.1.64			
CN_FF	691200	0	10.33.44.26	10.33.44.58	aCN_FF.acme.com	acme.com	aCN_FF.acme.com	691200	3600	10.22.1.64	10.11.1.64			
CN_LDN	691200	1	10.33.44.26	10.33.44.58	aCN_LDN.acme.com	acme.com	aCN_LDN.acme.com	691200	3600	10.22.1.64	10.11.1.64			
CN_SF	691200	0	10.33.44.26	10.33.44.58	aCN_SF.acme.com	acme.com	aCN_SF.acme.com	691200	3600	10.22.1.64	10.11.1.64			
MD_CN	691200	0	10.33.44.90	10.33.44.122	ins.acme.com	ipt.acme.com	acme.com	28800	3600	10.22.1.64	10.11.1.64			
3467	691200	1	10.33.44.26	10.33.44.58	a3467.acme.com	acme.com	acme.com	691200	3600	10.22.1.64	10.11.1.64			
2000	3600	0	10.33.44.26	10.33.44.58	a2000.acme.com	acme.com	a2000.acme.com	691200	3600	10.22.1.64	10.11.1.64		145.72.178.90	10.33.122.30
2100	3600	1	10.33.44.26	10.33.44.58	a2100.acme.com	acme.com	ipt.acme.com	691200	3600	10.22.1.64	10.11.1.64			
2500	691200	1	10.33.44.26	10.33.44.58	a2500.acme.com	acme.com	ipt.acme.com	691200	3600	10.22.1.64	10.11.1.64			
7000	691200	1	10.33.44.26	10.33.44.58	a7000.acme.com	acme.com	a7000.acme.com	691200	3600	10.22.1.64	10.11.1.64			
7001	691200	1	10.33.44.26	10.33.44.58	a7001.acme.com	acme.com	a7001.acme.com	691200	3600	10.22.1.64	10.11.1.64			
7100	691200	1	10.33.44.26	10.33.44.58	a7100.acme.com	acme.com	acme.com	691200	3600	10.22.1.64	10.11.1.64			

Non-DHCP Option configuration

A few configurable options exists that are strictly speaking not DHCP options, but are specific to
Infoblox.

These are options concerning:

1. Extensible Attributes
2. Member Assignment
3. Dynamic DNS

Extensible Attributes

> Please see the detailed article on Infoblox Extended Attributes mapping

With each "network" and "scope" object a set of Extensible Attributes can be added using the
mapping method described in this article.

Member Assignment

All "networks" and "scopes" are assigned one or more GridMembers although scopes should have
only one active DHCP server issuing Ip-addresses from any range.

The GridMember assignment is configured on a per tree object (network or scope) basis using the
Features list. Four entries in this features list control which members (the active DHCP servers) can
'manage' this network or range.

1. **dhcpsrv1** which indicates the value in **Dhcp_clients.Dhcpsrv1_feature** is to be used.
2. **dhcpsrv2** which indicates the value in **Dhcp_clients.Dhcpsrv2_feature** is to be used.
3. **dhcpsrv(…)** function which specifies the dhcp server directly in its argument.
4. **vlan_odd(… , …)** function which chooses between two members based on the Vlan-id being odd or even.
5. **site_hk(… , …)** function which chooses between two members based on the Site_type starting with the characters HK or not.

Multiple of these feature entries may be used in the same list, although that would normally only make senese using the dhcpsrv() function.

All three functions accept as arguments direct ip-addresses or the names of any of the 'feature' columns in the Dhcp_clients table.

Dynamic DNS

This "option" enables or disables dynamic DNS (ddns) to automatically add a dns entry while a lease is in use.

The option is enabled or disabled on a per "network" or "scope" basis using the Features list of the IPAM tree. Then, the customer specific value is lifted from the **Dhcp_clients.Ddns_enable** and only if its value is non-zero will the Ddns be enabled.

Infoblox Template

Tree objects can be created using Infoblox Templates allowing for standardized construction blocks when creating a new IPAM. Although useful, its use is limited to the object's initial creation. Any changes to the template later will have no effect.

To specify an Infoblox template, include the **template(…)** function with the desired template as argument in the tree object's Features list.

DHCP Option configuration

1 | subnet-mask

The subnet mask value of the subnet/network is calculated from the network prefix.

3 | routers

This option sets the default gateway. The subnet / network address with an offset of `0.0.0.1` is used.

There is currently no method to override this behaviour.

6 | domain-name-servers

This option sets the list of DNS servers ip-addresses to consult. Multiple DNS servers can be assigned. The values can be taken form the Dhcp_clients table, or directly in the features list of the IPAM tree's network/scope.

The Client specific values are added to the list if present in this order:

1. **Dhcp_clients.Dns_pri**
2. **Dhcp_clients.Dns_sec**
3. **Dhcp_clients.Dns_tert**

The Tree specific values override the client specific values. These are added using the **dnssrv(…)** function in Dhcp_tree features list. Any number of dns servers can be added in the order desired:

1. **dnssrv**(172.32.10.10)**,dnssrv**(172.30.10.10)

15 | domain-name

The default value for the domain name is the one defined in the supernet allocation with the client.

The Dhcp_tree feature list controls the assignment of direct or indirect domain names.

1. **domain1** which indicates the value in **Dhcp_clients.Domain1_feature** is to be used.
2. **domain2** which indicates the value in **Dhcp_clients.Domain2_feature** is to be used.
3. **domain3** which indicates the value in **Dhcp_clients.Domain3_feature** is to be used.
4. **domain(…)** function which specifies the domain name directly.

Only one domain name can be assigned to the network/scope, the last encountered value will be used.

43 | vendor-encapsulated-options

This option works alongside option 60, vendor-class-identifier, and is used to identify the Wireless LAN Controllers.

The Ip-addresses of the two supported entries are converted in HEX, and the format requires that the first entry starts with F1:04, the second with F1::08 (08 is number of octets in 2 ip-addr).

The Ip-addresses of the Client specific WLC servers are not present in the DHCP_clients table but are lifted from the NetYCE configuration of the client. The client needs to have one or two "WLC servers" configured.

The first server reported must have the server_name "**Wlc_server**", the second server the name "**Wlc_ap_mgmt**". The YCE.Ip_server table is consulted for this client to find the Server_address for these servers.

There currently exists no means way to directly specify this option from the features list.

44 | netbios-name-servers

The two supported NetBios name servers that can be used for option 44 are taken from:

1. **Dhcp_clients.Wins_pri* -** Dhcp_clients.Wins_sec*

There currently exists no means way to directly specify this option from the features list.

46 | netbios-node-type

The value for this option is hardcoded to **2**, indicating a hybrid node-type tat uses both dns and wins.

51 | lease-time

This option sets the lease time for an DHCP ip-address in seconds.

The value set in the **Dhcp_clients.Lease_time** is used, or the default value of **604800** corresponding to seven days.

This value can be overridden using "feature" list entries in the IPAM tree's network/scope:

1. **feature1** which indicates the value in **Dhcp_clients.Lease1_feature** is to be used.
2. **feature2** which indicates the value in **Dhcp_clients.Lease2_feature** is to be used.

If both are present in the same feature list, then the last encountered value is used.

51a | lease-time

This option sets the lease time for an DHCP ip-address in seconds. This actually not-existing option number is just a quick way to assign the hardcoded lease-time of **3600** to option 50. If both option 51 and options 51a are present in the option-list, the last encountered option is used.

60 | vendor-class-identifier

This option works alongside option 43, vendor-encapsulated-options, and is used to define Wifi AP Class name. It is currently hardcoded to **Cisco AP c1140**

There currently exists no means way to directly specify this option from the features list.

150 | TFTP-Servers

This option exists as "custom" option 150 in the DHCP option space using the name **TFTP-Servers** and serves to provide a list of TFTP servers.

The Ip-addresses of the Client specific TFTP servers are not present in the DHCP_clients table but are

lifted from the NetYCE configuration of the client. The client needs to have one or two "IPT callmanager servers" configured.

The first server reported must have the server_name "**Ipt_callmgr1**", the second server the name "**Ipt_callmgr**". The YCE.Ip_server table is consulted for this client to find the Server_address for these servers.

The Tree specific value option uses the feature list function **tftp(…)**. Any number of these tftp server addresses may be includes and are added in sequence as encountered.

The feature added servers override any client specific ones.

150a | TFTP-Servers

This option is identical to option 150 but uses a different set of server names for the client specific values.

This option exists as "custom" option 150 in the DHCP option space and serves to provide a list of TFTP servers.

The Ip-addresses of the Client specific TFTP servers are not present in the DHCP_clients table but are lifted from the NetYCE configuration of the client. The client needs to have one or two "IPT callmanager servers" configured.

The first server reported must have the server_name "**Ipt_callmgr_RN1**", the second server the name "**Ipt_callmgr_RN2**". The YCE.Ip_server table is consulted for this client to find the Server_address for these servers.

The Tree specific value option uses the feature list function **tftp(…)**. Any number of these tftp server addresses may be includes and are added in sequence as encountered.

The feature added servers override any client specific ones.

241 | WLC-Servers

This option exists as "custom" option 241 in **Wifi** option space using the name **WLC-Servers**.

The is used to identify the WLC servers as readable ip-addresses (as opposed to option 43).

The Ip-addresses of the Client specific WLC servers are not present in the DHCP_clients table but are lifted from the NetYCE configuration of the client. The client needs to have one or two "WLC servers" configured.

The first server reported must have the server_name "**Wlc_server**", the second server the name "**Wlc_ap_mgmt**". The YCE.Ip_server table is consulted for this client to find the Server_address for these servers.

There currently exists no means way to directly specify this option from the features list.

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