Appendix C: Configuring an IOS DHCP Server to Support the SV-4K and DMP-2K

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Note: An IOS Switch is not recommended as a production DHCP server for a venue. This example is provided to allow for simple DHCP support for DMPs primarily used for testing and in a lab.

In this example, a Cisco IOS DHCP server is being used. Only a single pairing of options 60 and 43 can be used within a single scope (two different IP scopes are required if there is a need to support both the Cisco DMP-4310G and the SV-4K media players, for example).

Note: If a Cisco IOS DHCP Server is used for IP address allocation for DMP's in a production network, we strongly recommend using database agents to maintain the DMP address bindings in case the switch is rebooted. See IP Addressing: DHCP Configuration Guide, Cisco IOS XE Release 3SE (Catalyst 3850 Switches) for further IOS DHCP Server configuration.

SV-4K DHCP Scope Example

This is an example using the specific strings that apply to an SV-4K media player.

```
! DHCP Database Agent CLI example
ip dhcp database ftp://user:password@172.16.4.253/router-dhcp write-delay 120
!
ip dhcp pool SV-4K
network 10.10.1.0 255.255.255.0
default-router 10.10.1.1
option 60 ascii Cisco SV-4K-NA
option 43 hex
5540.6874.7470.3A2F.2F31.302E.3139.342E.3137.352E.3132.323A.3830.3830.2F53.7461.6469.756D.5669.7369.6F6
E.2F64.6D70.5F76.342F.7363.7269.7074.732F.626F.6F74.2E62.7273
```

Note: The periods in the option 43 string are automatically created by the IOS and are not typed when creating the ASCII string. An example of the raw ASCII string value as typed can be found below.

Creating Option 60

Type the "option 60" line as shown in SV-4K DHCP Scope Example, page 65.

Possible variations are:

- Some Cisco IOS software versions may require the text enclosed in quotes "Cisco SV-4K-ROW".

  Note: If the Cisco IOS software does not accept a leading quote in the string, then quotations are not needed.

- DHCP Option 60 Vendor Class Identifier string for DMPs:

  - DMP-2K string for new, factory-shipped devices: "Cisco DMP-2K"

  - SV-4K string for North America: "Cisco SV-4K-NA"

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       –   SV-4K string for all other regions: "Cisco SV-4K-ROW"

Creating Option 43

Option 43 is a vendor-specific option. For the SV-4K and DMP-2K media player, it needs to point to a specific URL to execute auto-registration, auto-provisioning, and to receive initial firmware and subsequent upgrades, etc. That URL is:

http://*x.x.x.x*:8080/StadiumVision/dmp_v4/scripts/boot.brs

where *x.x.x.x* represents the IPv4 address of the Cisco Vision Dynamic Signage Director server.

Note: Different devices require option 43 information be presented in different formats.

The SV-4K and DMP-2K media player require type-length-value (TLV) format for the data string. Specifically, the TLV format is constructed in the following manner:

- The string is built using hex values.

- The string begins with a two-character hex representation of the option 43 Type (an option 43 sub-option).

- The second two-character hex representation is the length of the information string, expressed in the number of ASCII characters of the string.

- Following the length value, the ascii string is typed out by using the two-character hex representation of each character in the string.

- For the SV-4K media player, the type designation is type 85 (decimal), expressed as type 55 (hex).

Option 43 Example

For the following URL string:

```
http://10.194.175.122:8080/StadiumVision/dmp_v4/scripts/boot.brs
```

The option 43 string would be as follows (except all on one line, without carriage returns) in the following format:

option 43 hex
5540.6874.7470.3A2F.2F31.302E.3139.342E.3137.352E.3132.323A.3830.3830.2F53.7461.6469.756D.5669.7369.6F6
E.2F64.6D70.5F76.342F.7363.7269.7074.732F.626F.6F74.2E62.7273

Note: There is a space here between 'hex' and the remainder of the string

Using the sample URL above and , the first characters of the hex value are translated in the following way:

55*40.6874.7470.3A2F.2F**31.302E.3139.342E.3137.352E.3132.323**A.3830.3830.2F53.7461.6469.756D.5669.7369.6F6
E.2F64.6D70.5F76.342F.7363.7269.7074.732F.626F.6F74.2E62.7273**

- 55 – Type code in hex

- 40 – Length of the characters to the right of the length value, expressed by counting the number of two-character ascii characters represented (form the chart below). The numbers if characters in the example above is 64 (Decimal 64 = 40 hex).

- And the first few characters, one at a time, would be:

```
68 74 74 70 3A 2F 2F
H  t  t  p  :  /  /
```

The IP address is then represented the same way:

```
31 30 2E 31 39 34 2E 31 37 35 2E 31 32 32
```

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```
1  0  .  1 9 4  .  1 7 5  .  1 2 2
```

The remainder of the string is the text of the remainder of the URL:

```
:8080/StadiumVision/dmp_v4/scripts/boot.brs
```

```
A.3830.3830.2F53.7461.6469.756D.5669.7369.6F6E.2F64.6D70.5F76.342F.7363.7269.7074.732F.626F.6F74.2E62.7
273
```

Note: As a Linux OS device, the Cisco Vision Dynamic Signage Director server is case sensitive, and the correct letter case must be represented in the ASCII text strings.

TIPS

■ To make creating the string easier, start the string with 55 and copy the remainder of the ASCII string past the IP address, as these values never change.

■ The example string had a length value of 40 (64 represented as a hex value).

■ In this value, do not represent 64 as the hex character values of 6 and 4: instead, take the decimal value of 64 and convert to its equivalent hex (base 16) value (64 was converted to 3E in the example).

■ Decimal-to-hex converters are easily found on the Internet, and most computer calculators have a decimal-to-hex function available, possibly under an advanced feature.

The example IP address was 14 characters long which leaves the remainder of the hex string to be 50 characters long. Add the number of ASCII characters in your IP address (including the dots!) to the known 50 characters and create your string length value to replace the 40.

This technical information can be used to program other 3rd-party DHCP servers.

Table 1   ASCII Character Lookup Table

Decimal	Hex	Symbol	Description
32	20		Space
33	21	!	Exclamation mark
34	22	"	Double quotes (or speech marks)
35	23	#	Number
36	24	$	Dollar
37	25	%	Procenttecken
38	26	&	Ampersand
39	27	'	Single quote
40	28	(	Open parenthesis (or open bracket)
41	29	)	Close parenthesis (or close bracket)
42	2A	*	Asterisk
43	2B	+	Plus
44	2C	,	Comma
45	2D	-	Hyphen
46	2E	.	Period, dot or full stop
47	2F	/	Slash or divide

SV-4K DHCP Scope Example

Table 1   ASCII Character Lookup Table (continued)

Decimal	Hex	Symbol	Description
48	30	0	Zero
49	31	1	One
50	32	2	Two
51	33	3	Three
52	34	4	Four
53	35	5	Five
54	36	6	Six
55	37	7	Seven
56	38	8	Eight
57	39	9	Nine
58	3A	:	Colon
59	3B	;	Semicolon
60	3C	<	Less than (or open angled bracket)
61	3D	=	Equals
62	3E	>	Greater than (or close angled bracket)
63	3F	?	Question mark
64	40	@	At symbol
65	41	A	Uppercase A
66	42	B	Uppercase B
67	43	C	Uppercase C
68	44	D	Uppercase D
69	45	E	Uppercase E
70	46	F	Uppercase F
71	47	G	Uppercase G
72	48	H	Uppercase H
73	49	I	Uppercase I
74	4A	J	Uppercase J
75	4B	K	Uppercase K
76	4C	L	Uppercase L
77	4D	M	Uppercase M
78	4E	N	Uppercase N
79	4F	O	Uppercase O
80	50	P	Uppercase P
81	51	Q	Uppercase Q
82	52	R	Uppercase R
83	53	S	Uppercase S

SV-4K DHCP Scope Example

Table 1   ASCII Character Lookup Table (continued)

Decimal	Hex	Symbol	Description
84	54	T	Uppercase T
85	55	U	Uppercase U
86	56	V	Uppercase V
87	57	W	Uppercase W
88	58	X	Uppercase X
89	59	Y	Uppercase Y
90	5A	Z	Uppercase Z
91	5B	[	Opening bracket
92	5C	\	Backslash
93	5D	]	Closing bracket
94	5E	^	Caret - circumflex
95	5F	_	Underscore
96	60	`	Grave accent
97	61	a	Lowercase a
98	62	b	Lowercase b
99	63	c	Lowercase c
100	64	d	Lowercase d
101	65	e	Lowercase e
102	66	f	Lowercase f
103	67	g	Lowercase g
104	68	h	Lowercase h
105	69	i	Lowercase i
106	6A	j	Lowercase j
107	6B	k	Lowercase k
108	6C	l	Lowercase l
109	6D	m	Lowercase m
110	6E	n	Lowercase n
111	6F	o	Lowercase o
112	70	p	Lowercase p
113	71	q	Lowercase q
114	72	r	Lowercase r
115	73	s	Lowercase s
116	74	t	Lowercase t
117	75	u	Lowercase u
118	76	v	Lowercase v

SV-4K DHCP Scope Example

Table 1   ASCII Character Lookup Table (continued)

Decimal	Hex	Symbol	Description
119	77	w	Lowercase w
120	78	x	Lowercase x
121	79	y	Lowercase y
122	7A	z	Lowercase z
123	7B	{	Opening brace
124	7C	|	Vertical bar
125	7D	}	Closing brace
126	7E	~	Equivalency sign - tilde
127	7F		Delete