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Content

Chapter 1	WDS.....	1-1
1.1	Introduction to WDS	1-1
1.2	WDS Basic Configuration	1-2
1.3	WDS Examples.....	1-5
1.4	WDS Troubleshooting	1-6

Chapter 1 WDS

1.1 Introduction to WDS

WDS (WLAN Distribution System) is using the wireless connection to link up two independent network and using several of AP for communication. Thus, it will create a ESS, and provide data transmission between themselves. Right now, 802.11 wireless technologies is very common among local families, SOHO, and business. The user can obtain the wireless service through these networks. Using the wire to connect the AP will make the wireless structure become more complex, with higher cost and time consuming. While using WDS technology can let the administer build up a cheaper wireless network with shorter time.

The WDS module is composed by same WDS AP and at least one AP. The AP in WDS AP is composed by Root AP and Satellite AP. Root AP connect AC with wire. AP will send WDS configuration of Root AP to AP by WDS configuration messages after managed Root AP. The messages including the following information: radio id that AP used for creating WDS Link, vap id, wdsmode, wds-ssid, remote MAC (one VAP MAC of satellite AP) address that link to end AP used to create link, the messages between WDS AP is enciphered or not, if it will be enciphered, it needs to send to encipher policy and password and so on.

Root AP will send Beacon frame according to configuration after receive configuration messages.

AP will be configured some parameters before satellite AP associated to wire system:

1. Satellite mode of AP. Configure it can make Satellite AP discover and create WDS link with Root AP. Every radio only can configure one satelliteap to do WDS link.
2. Create remote AP's MAC address of WDS link. Satellite AP must configure it. When VAP was configured to Satellite mode, the VAP mode will turn out to be STA mode, namely client mode and it will send link request to Root AP, the scene will be usuall client line on. Set Remote MAC means create a ACL rule, the VAP only permits Remote MAC communicate with corresponding AP and make sure Satellite AP linked specified AP.
3. WAP2 private authentication key of creating WDS link. If it configured WDS in rootap to be encipher form, Satelliteap must be configured same authentication encipher form and key, otherwise, it can not create WDS link between Satellite AP and Root AP.

After the new configuration is effective, Satellite AP will scan each channel inturn constantly to find AP which can create WDS link. After Satellite AP finds Root AP, it will wait to receive Beacon frame from RootAP and check, then Satellite AP will create WDS link with Root AP, associated to AC by created WDS link and managed by AC. When the

state of Satellite AP turn into managed, AC will send related WDS configuration to the AP.

1.2 WDS Basic Configuration

A . Configuration of WDS on AC

1) Add/Delete WDS mode of network

Command	Explanation
Network Config mode	
wds-mode rootap no wds-mode	Enable WDS function of network and set it to Root AP mode; the no command close WDS mode of network.

2) Configure/Delete WDS remote VAP MAC of network

Command	Explanation
Network Config Mode	
wds-remote-vap <macaddr> no wds-remote-vap	Configure remote VAP mac address for create wds link for network; the no command delete created WDS link remote VAP MAC in network.

3) Configure SSID of WDS function

Command	Explanation
Network Config mode	
ssid <name>	Enable network's SSID of WDS function. <name>, represent the network SSID, the length is 1-32 characters, including numbers, letters and special characters such as "-_+".

4) Configure the authentication mode network supported, no command recover authentication to laws password

Command	Explanation
Network Config mode	
security mode {none wpa-personal} no security mode	Configure authentication and encipher way network supported; the no command delete configured authentication and encipher way network supported. none represents laws password, it means that it have none wireless authentication and encipher configuration. Wpa-personal represents configure security way as

	wpa-personal.
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5) Configure/ delete WPA share key of network

Command	Explanation
Network Config mode	
wpa key <value> no wpa key	Configure WPA share key of network; the no command delete configured network WPA share key. <value> is a character string which include 8-63 characters, the default is none.

6) Configure the agetime of wds items and no command recover default

Command	Explanation
Wireless Config mode	
agetime wds-list <value> no agetime wds-list	Configure the agetime of wds items; the no command recovers the default wds items agetime. <value>, it ranges from 0 to 300 and 0 stands for no ageing.

7) Clear the wds information AP sent.

Command	Explanation
Privileged EXEC mode	
clear wireless wds list	Clear the wds information AP sent.

B. Only configured on the AP

1) Configure/Delete Satellite mode of VAP

Command	Explanation
Privileged EXEC mode	
set wds wds<vap-id> wds-mode {satelliteap none}	Parameter satelliteap means configured VAP to satellite mode; parameter none means delete satelliteap mode of VAP. < vap-id>: ID number of vap, single radio ranges from 0 to 15, double radio ranges from 0 to 31.

2) Open or close wds mode.

Command	Explanation
Privileged EXEC mode	
set wds wds<vap-id> wds-status <up down>	Up means open WDS mode; down means close WDS mode. < vap-id>: ID number of vap, single radio ranges from 0 to 15, double radio ranges

	from 0 to 31.
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3) Configure ssid used when create wds connection.

Command	Explanation
Privileged EXEC mode	
set wds wds<vap-id> wds-ssid	<p>The ssid of satelliteap configured wds-ssid and rootap must be same otherwise wds can not create.</p> <p>< vap-id>: ID number of vap, single radio ranges from 0 to 15, double radio ranges from 0 to 31</p> <p><word> : The length is within 1-32 characters, including numbers, characters, spaces and special characters such as “- _+”.</p>

4) Configure vap mac address of remote AP of satelliteap.

Command	Explanation
WDS AP Group Config mode	
set wds wds<vap-id> remote-mac <macaddr >	<p>Configure vap mac address of remote ap when create wds link.</p> <p>< vap-id>: ID number of vap, single radio ranges from 0 to 15, double radio ranges from 0 to 31.</p> <p><macaddr >: AP corresponding vap mac address of the remote created wds link.</p>

5) Configure authentication and encipher way of wds communication messages.

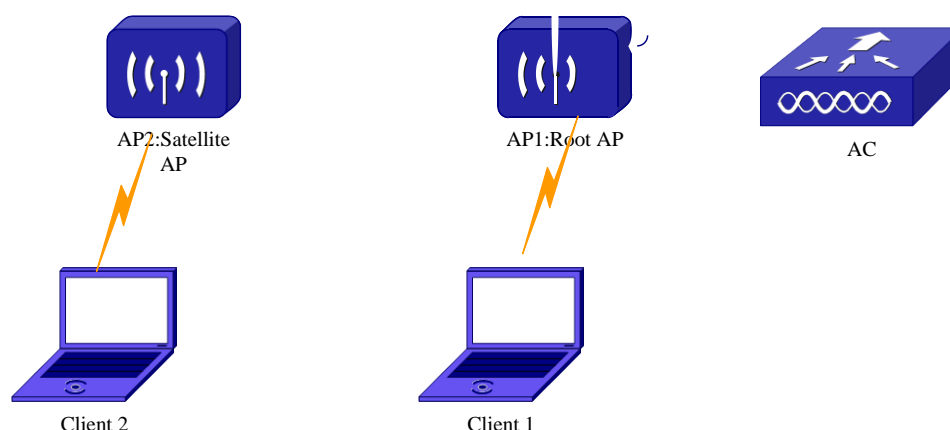
Command	Explanation
Privileged EXEC mode	
set wds wds<wds-id> wds-security-policy { wpa-personal plain-text}	<p>WDS link will be created until configured encipher form and password of satelliteap and rootap is same.</p> <p>< vap-id>: ID number of vap, single radio ranges from 0 to 15, double radio ranges from 0 to 31.</p> <p><wpa-personal>: Configure to be wpa-personal and users can configure password.</p> <p><plain-text> : It will not configure</p>

	password after configure it, and it will be open.
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6) Configure the encipher form of WDS communication messages.

Command	Explanation
Privileged EXEC mode	
set wds wds<vap-id> wds-wpa-personal-key <word >	<p>When configure WDS communication messages encipher, users also can configure encipher password at the same time. The two password must be same when create wds link.</p> <p>< vap-id>: ID number of vap, single radio ranges from 0 to 15, double radio ranges from 0 to 31.</p> <p><word> : It is a character string which includes 8-63 characters.</p>

1.3 WDS Configuration



Build up the environment as shown above. AC and Root AP located on a place that can connect to wire network, while Satellite AP just located on a place that wire network cannot reach. At the end, these two outlying AP can connect to the main stream network

through the wireless WDS connection between AP. Then create WDS link for configured vap1 of AP1 and AP2. Root AP base-mac as 00-03-0f-80-50-20, Satellite AP base-mac as 00-03-0f-26-18-60

AC configuration as following:

```
Switch# config
Switch(config)#wireless
Switch(config-wireless)#network 100
Switch(config-network)# wds-mode rootap
Switch(config-network)# wds-remote-mac 00-03-0f-26-18-61
Switch(config-network)# ssid WDS
Switch(config-network)# security mode wpa-personal
Switch(config-network)# wpa key 12345678
```

The network is band to vap1 of profile in AP1 and sending configuration.

Satellite AP configuration:

```
set wds wds1 wds-mode satelliteap
set wds wds1 wds-ssid WDS
set wds wds1 remote-mac 00:03:0f:80:50:21
set wds wds1 wds-security-policy wpa-personal
set wds wds1 wds-wpa-personal-key 12345678
set wds wds1 wds-status up
```

Once the new configuration of Satellite AP1 is effective, it will scan each of the channels to see ssid for WDS network. After receive Beacon frame from Root AP, compare authentication form and key for remote-mac, if it matches perfectly, Satellite AP will create WDS link with Root AP, then associated to AC by created WDS link and managed by AC. AC will do configuration or sending operation for Satelliteap by WDS.

1.4 WDS Troubleshooting

- ☞ Before build up the connection, we need to ensure that Root AP and AC are wire connected, AC configured rootap correctly and send configuration, and using corresponding get command in AP to check configuration is sending or not.
- ☞ Set wds-mode to satelliteap in Satellite AP, ensure wds-status is up and it is up in radio.
- ☞ If rootap uses WPA-Personal authentication form, ensure configured authentication form and key of AC in Satellite AP is same with rootap, otherwise, cannot build up the connection.
- ☞ Ensure the opposite end MAC of rootap and satelliteap is correct MAC address for creating WDS link.
- ☞ The wire of Satellite AP cannot connect with AC wireless AP profile apply on AC to send out the configuration.