APPLICATION NOTES

Seamless Integration of LAN and WLAN through Brocade mobility products and ShoreTel VoIP Phones

This solution leverages interoperable and best-of-breed networking and security products, tailored to fit individual enterprise requirements.
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INTRODUCTION
Brocade® and ShoreTel are partnering to deliver a compact plug and play solution for LAN to WLAN secure connectivity with ShoreTel VoIP phones and Brocade Mobility Wireless LAN controllers and Access Points. This joint solution brings end-to-end networking and security to the enterprise.

About ShoreTel
ShoreTel is the provider of brilliantly simple Unified Communications (UC) solutions based on its award-winning IP business phone system. With our Unified Communications solution, enterprises trade complexity for plug-and-play simplicity in integrated voice, video, data, and mobile communication.

For ShoreTel Support
- Phone support in the US: 1-800-742-2348
- International support: http://support.shoretel.com/contact_us/E-mail support:
  - shorecare_admin@shoretel.com
  - Web support: http://support.shoretel.com/

About Brocade
Brocade is a leading provider of high-performance data center, enterprise, and service provider networking solutions and services. Brocade develops extraordinary networking solutions that enable today’s complex, data-intensive businesses to optimize information connectivity and maximize the business value of their data. The Brocade ServerIron ADX Series of application delivery and traffic management switches is the industry leader in high availability, acceleration, security, and scalability for business-critical IP and Web applications.

For Brocade support:
- Phone support in the US: 1-800-752-8061
- International support: www.brocade.com/services-support/contacts_international.page
- E-mail support: ipsupport@brocade.com
- Web support: www.brocade.com/services-support

Overview
To achieve a compact plug and play solution for LAN to WLAN, you can Adopt Access Point in Mobility Wireless LAN Access. In a compact plug and play configuration, VoIP are connected to the RFS controller along with a compact home server to hold configurations files and other data.

RFS Controller acts as the DHCP server and NTP server. It Adopts the AP which can control all the other wireless devices like laptop, smart phone and smart pad. This allows the user to have a seamless integration from LAN to WLAN and back to LAN. This solution can also be configured to provide adequate security to the devices connected to both LAN and WLAN.

This solution is an example of a seamless integration of LAN and WLAN that uses DHCP, 802.11n with the speeds up to 600MPbs.

DHCP
Dynamic Host Configuration Protocol (DHCP) is an Internet Engineering Task Force (IETF) standard designed to reduce the administration burden and complexity of configuring hosts on a Transmission Control Protocol/Internet Protocol (TCP/IP)-based network, such as a private intranet. By using DHCP server computers to centrally manage IP addresses and other related configuration parameters, using DHCP client
computers to request and accept TCP/IP configuration information from DHCP servers, and using DHCP relay agents to pass information between DHCP clients and servers, the process of configuring TCP/IP on DHCP clients is automatic.

Brocade Mobility Wireless LAN, RFS Controller can be configured as DHCP server which can lease out IP address for the specific time. Latter part of this document shows the step by step configuration of RFS controller as DHCP server.

NTP

Secure Network Time Protocol (SNTP) is central for networks that rely on their switch to supply system time. Without an SNTP implementation, switch time is unpredictable, which can result in data loss, failed processes and compromised security. With network speed, memory and capability increasing at an exponential rate, the accuracy, precision and synchronization of network time is essential in a switch managed enterprise network. The switch can either use a dedicated server to supply system time or can use several forms of SNTP messaging to sync system time with network traffic authenticated and secure for switch interoperation.

Brocade Mobility Wireless LAN, RFS Controller can be configured as Secure NTP which can synchronize with other NTP neighbors if needed. Latter part of this document shows the step by step configuration of RFS controller as Secure NTP

AP ADOPTION

Brocade Controllers can adopt Access Points. An Adaptive AP (AAP) is a Brocade Mobility 7131 Series Access Point that can adopt like a Brocade Mobility 300 Access Point (Layer 3). The management of an AAP is conducted by the controller, once the access point connects to a Brocade Mobility RFS4000, Brocade Mobility RFS6000 Controller or Brocade Mobility RFS7000 Controller and receives its AAP configuration.

Integration Test Results

Integration testing covered features, functionality, serviceability and mobility between Brocade Mobility Wireless LAN products and ShoreTel VoIP. The following compliance tests were conducted:

- **DHCP Service.** DHCP services were provided to the VoIP devices connected by Brocade Mobility wireless controller. The Phones were given IP address from the pool along with the options like FTP and NTP.

- **NTP Service.** NTP was enabled in the RFS. All of the devices in the LAN and WLAN under RFS was synced to the same time.

- **AP Adoption.** AP Adoption was achieved and RFS was able to control the APs though its Radio.

- **Mobility.** ESSID was set for a ESS setup and clients (Laptops, smart phones and ipads) were able to successfully connect to the WLAN.

- **Media types.** Tests were conducted with copper interfaces.

- **Port configuration.** Different port speeds were used: Auto-Negotiate and 1000-Full.
**REFERENCE ARCHITECTURE**

![Wireless Solution Topology]

**Figure 1.** wireless solution topology
Brocade RF Controller RFS Series Configuration

It is necessary to configure IP address through the console port before entering the RFS GUI. RFS controller have bps of 19200.

DHCP Server configuration in RFS Controller

To login on the GUI screen, enter https://1.1.1.2 on the URL. Following gives step by step configuration of Brocade RFS Controller's DHCP Services.

New DHCP Pool

Add a new DHCP pool as needed to suit the address distribution requirements of your network. To add a DHCP pool:

1. Select Services > DHCP Server from the main menu tree.
2. Click the Add button at the bottom of the screen.
3. Enter the name of the IP pool from which IP addresses can be issued to client requests on this interface.
4. Provide the Domain name as appropriate for the interface using the pool.
5. From the Network field, use the Associated Interface drop-down menu to define the switch interface is used for the newly created DHCP configuration. Use VLAN1 as a default interface if no others have been defined. Additionally, define the IP Address and Subnet Mask used for DHCP discovery and requests between the DHCP Server and DHCP clients.

6. Within the Servers field, change the server type used with the pool and use the Insert and Remove buttons to add and remove the IP addresses of the routers used.

7. Provide the Included Ranges (starting and ending IP addresses) for this particular pool. Use the Insert and Remove buttons as required to define the range of supported IP addresses. A network pool without any include range is as good as not having a pool, because it won’t be useful in assigning addresses.

8. Click OK to save and add the changes to the running configuration and close the dialog.

Global Options in DHCP

The DHCP Server screen’s Configuration and Host Pool tabs can be used to display an additional Global Options screen.

To define new global name and value and send it to other peer switches in the mobility domain:

1. Select Services > DHCP Server from the main menu tree.
2. Highlight an existing pool name from within either the Configuration or Host Pool tab and click the Options Setup button at the bottom of the screen is used to set.
To add a ShoreTel VoIP Phone, Insert new field with the following configurations:
NAME: Phone       NAME: NTP
CODE: 156           CODE: 004
TYPE: Ascii            TYPE: IP

Pool Options in DHCP
To configure pool options Go to Services > DHCP Server> Configuration> Options

Insert the addition values sent along with the DHCP service. With specific information of the type set in the above screen. Add, phone with IP address, FTP value, and NTP value.
NTP Configuration
To define the SNTP configuration:

1. Select Services > Secure NTP from the main menu tree.
2. Select the Configuration tab.
3. Select NTP Master Clock to enable RFS Controller as the NTP server and click Apply.
4. Select NTP Status tab to view the summary.

ACCESS POINT CONFIGURATION

To configure AP for Adoption:

1. Select Networking Configuration > LAN1 from the main menu tree.
2. Select the interface type and specify the IP address, Network Mask and the Default Gateway.
3. Select **System Configuration > System Setting** from the main menu tree.
4. Specify the name and location and leave the rest in the default mode.

5. Select **System Configuration > Adaptive AP Setup** from the main menu tree.
6. Enter the controller’s IP Address.
AP ADOPTION IN RFS CONTROLLER
1. Select Network > Access Point Radios from the main menu tree.
2. Click the Configuration tab.
3. Click the Edit button to launch a screen used to configure radio-specific parameters.
4. Click the Add button to add a radio. The radio must be added before the radio can be adopted.
5. APs will be visible in Network > Access Point Radios.

WLAN SETUP
To configure a WLAN:
1. Select Network > Wireless LANs from the main menu tree.
2. Click the Configuration tab.
3. Select a WLAN to modify from the table.
4. Click the Edit button to edit the values.
5. Specify the ESSID, Authentication along with the password also check Broadcast ESS.

NOTE: The Brocade Mobility RFS6000 Controller supports a maximum of 32 WLANs. The Brocade Mobility RFS7000 Controller supports a maximum of 256 WLANS. Brocade Mobility RFS4000 Controller supports a maximum of 24 WLANs.

VOIP AND WLAN DEVICES

All the VoIP phones which are connected to the LAN should be able to have IP address once they are powered on.

WLAN devices should be able to see the configured ESSID and once the correct password is entered, access should be granted.
## APPENDIX A: CLI Mode

### Running Configuration in RFS Controller 7131

```
! configuration of BR-RFS4000 version 4.3.3.0-006R
!
version 1.5
!

aaa authentication login default local none
service prompt crash-info
!
network-element-id BR-RFS4000
!
username "admin" password 1 f865b53623b121fd34ee5426c792e5c33af8c227
username "admin" privilege superuser
username "operator" password 1 fe96dd39756ac41b74283a9292652d366d73931f
!
!
ip access-list extended 100
   permit ip 10.99.0.0/24 any rule-precedence 10
!
spanning-tree mst configuration
   name My Name
!
ip name-server 4.2.2.2
ip dns-server-forward
wwan auth-type chap
no bridge multiple-spanning-tree enable bridge-forward
country-code us
logging buffered 4
logging console 4
```
snmp-server engineid netsnmp 6b8b45674d8307bb
snmp-server sysname BR-RFS4000
snmp-server manager v2
snmp-server manager v3
snmp-server user snmptrap v3 encrypted auth md5 0xf58a2750793247cd145ff7f8a1d0194d
snmp-server user snmpmanager v3 encrypted auth md5 0xf58a2750793247cd145ff7f8a1d0194d
snmp-server user snmpoperator v3 encrypted auth md5 0xf27b6efd4e8b17a9167c5da551bd47a72
ip nat outside source list 100 interface vlan2100 overload
ip nat inside source list 100 interface vlan1 overload
firewall dhcp-snoop-conflict-detection disable
firewall dhcp-snoop-conflict-logging disable
ip dhcp excluded-address 192.168.80.5
ip dhcp option Controller-Discovery 192 ascii
ip dhcp option Controller-IP 189 ascii
ip dhcp option Shoretel-IPPhones 156 ascii
ip dhcp option NTPServer 4 ip
ip http server
ip http secure-trustpoint default-trustpoint
ip http secure-server
ip ssh
no service pm sys-restart
timezone America/Los_Angeles
!
wireless
secure-wispe-default-secret 0 defaultS
wlan 1 enable
wlan 1 ssid DemoKit
wlan 1 encryption-type ccmp
wlan 1 dot11i phrase 0 demokit1
radio add 1 00-24-38-F3-97-9C 11bgn 7131
radio 1 radio-number 1
no radio 1 dynamic-chain-sel enable
radio add 2 00:24:38:F3-97-9C 11an 7131
radio 2 radio-number 2
no radio 2 dynamic-chain-sel enable
radio add 20 00:24:38:F1-F5-50 11an 7131
radio 20 channel-power indoor random 6
radio 20 adoption-pref-id 20
no radio 20 dynamic-chain-sel enable
no radio default-11an dynamic-chain-sel enable
no radio default-11bgn dynamic-chain-sel enable
no ap-ip default-ap controller-ip
ap 00:24:38:F3-97-9C radio-config 2-4-wlan-5-0-wlan
ap 00:24:38:F1-F5-50 radio-config 5-0-wlan-only
smart-rf
  radio 1 radio-mac 00:24:38:F3-88-F0
  radio 2 radio-mac 00:24:38:F3-79-10
!
wireless
!
!
radius-server local
!
interface ge1
  switchport access vlan 1
  ip dhcp trust
!
interface ge2
  switchport access vlan 1
  ip dhcp trust
!
interface ge3
  switchport access vlan 1
  ip dhcp trust
interface ge4
  switchport access vlan 1
  ip dhcp trust

interface ge5
  switchport access vlan 1
  ip dhcp trust

interface up1
  switchport access vlan 2100
  ip dhcp trust

interface vlan1
  ip address 10.99.0.1/24
  ip nat inside

interface vlan2100
  ip address dhcp
  ip nat outside

ip dhcp pool shoretel
  domain-name Shoredemo
  default-router 10.99.0.1
  option Shoretel-IPPhones ftpservers=10.99.0.10,country=1,language=1
  option NTPServer 10.99.0.1
  network 10.99.0.0/24
  address range 10.99.0.85 10.99.0.95

service dhcp

rtls
rfid
espi
sole
!
ntp master
line con 0
line vty 0 24
!
end