Deploying Microsoft Lync over Wi-Fi using Ruckus products

Best Practice Configuration Guide

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Introduction

Microsoft Lync delivers a platform for unified communication, which is widely accepted in the enterprise environment. Apart from instant messaging, voice and video calling Lync is also capable of file transfer, Web conferencing and email. These services can be utilized not only within the internal organization but with the external world as well.

A good enterprise Wi-Fi infrastructure design however should be able to deliver high quality user experience while rendering the various services provided by the unified communication platform of Lync. The final design, deployment and performance of the network is drastically impacted due to the following:

- Lync infrastructure capabilities (server and client)

- Deployment environment

- Wi-Fi configuration to optimize Lync

Fortunately, with the right Wi-Fi technology and careful planning, most if not all of these issues can be dealt with. This document discusses how to configure Ruckus products while optimizing Lync over Wi-Fi.

This document serves engineers who have some background in Wi-Fi design, VoIP and 802.11 wireless engineering principles. It also assumes the presence of a working Lync environment over Ruckus's WLAN infrastructure.

Network components

Microsoft Lync server

Microsoft Lync server communication software offers solutions that can support enterprise-level collaboration requirements. Using a single management infrastructure,

Lync client/s and server communication can be monitored that are deployed over a unified communication environment.

Microsoft Lync client

Microsoft Lync provides software for Windows and Mac environment that has a different feature set targeted toward corporate environments. Microsoft Lync mobile clients enable mobile devices to function as unified communications (UC) endpoints.

Ruckus Controller

Ruckus WLAN controllers use a highly intuitive Web user interface to make configuration and administration of the entire WLAN a breeze. It provides highly required Enterprise and Service Provider features such as strong security, high resilience, massive scalability and a simple to use Graphical User Interface.

Ruckus Access Point

Ruckus Access Points (APs) bring power and simplicity together which are required for enterprise deployments. With patented adaptive antenna technology, Ruckus APs provide high performance, capacity and interference avoidance.

Configuration description

This section provides a brief overview of parameters that need to be configured for optimizing Microsoft Lync's user experience. Configuration details can be found in appendix. These parameters are as follows:

- WLAN prioritization
- SmartRoam
- OFDM and CCK rates
- Background scanning

WLAN Prioritization

One option to help maintain the highest level of prioritization for Lync traffic is to give it priority over other WLANs. Normally, an AP queues traffic and sends the highest priority first – but if multiple WLANs have the same type of traffic they are transmitted in order. WLAN prioritization can be used to give an additional priority to a Lync WLAN when other WLANs contain high priority traffic as well.

To configure WLAN prioritization, each WLAN must be configured as either low or high priority. If only one Lync WLAN is in use, it is recommended to configure the other WLANs as low priority. This ensures no other WLANs can contend with the Lync WLAN for the highest priority.

NOTE: The default prioritization value for WLAN is "High". Therefore any non-important WLAN should be edited and set to "Low" example of which maybe be a Guest WLAN.

Setting the WLAN's priority to Low does not mean QOS is no longer applied to traffic for that WLAN. Different prioritization for clients on that WLAN is still honored. The only difference is in whether their traffic is prioritized against a similar level of traffic from a high priority WLAN.

Ruckus AP's also have an inbuilt SmartCast feature which performs traffic classification by uniquely identifying voice and video using traffic classification heuristics. APs detect traffic types by consistent traits in application flows, such as average packet size and inter-packet gap. APs then maintain application states for each client device and prioritize their traffic according to the application characteristics and requirements. Hence, in a single WLAN, voice gets the highest priority followed by video and data.

SmartRoam

Mobility constitutes an important aspect of the Wi-Fi infrastructure. A user should be able to walk throughout the wireless facility while using their Lync client and the client should roam from one access point to another seamlessly. However, in the real world some clients tend to stay connected to the older access point in-spite of moving away from it. These clients are dubbed as "sticky" clients. To improve the performance of these clients, it becomes crucial to disconnect them from the older access point and force them to join the new access point.

The Ruckus SmartRoam feature alleviates this issue. SmartRoam assists sticky clients by encouraging them to disconnect from the older access point and connect to the

new access point. However, SmartRoam induced roams are of the "break before make" variety as opposed to client initiated ones, which are "make before break". This is the reason why SmartRoam appears to adversely affect Lync performance in real world. As a result, it should always be disabled on Lync WLAN to avoid poor user experience.

OFDM and CCK Rates

Connection rates are important to ensure high performance. Even though a voice connection sends relatively little data, it requires quick access to the medium when it needs to transmit. The higher the connection rate for all clients, the faster they can get on and off the air. This means less contention for the wireless airtime.

One way to achieve higher data rates is through the use (or disuse) of two of the available 802.11 modulations: Orthogonal Frequency Division Multiplexing (OFDM) rates and Complementary Code Keying (CCK) rates. Each of these is a modulation scheme used in 802.11 networks. CCK is a legacy system that is only used by 802.11b networks. Newer technologies such as 802.11g and 802.11n (and the older 802.11a) use OFDM.

OFDM and CCK are distinguished by a different set of basic rates as well as different receiver sensitivities:

CCK Rates	
Transmit Speed	Rx Sensitivity
11 Mbps	-82 dBm
5.5 Mbps	-85 dBm
2 Mbps	-86 dBm
1 Mbps	-89 dBm

OFDM Rates	
Transmit Speed	Rx Sensitivity
54 Mbps	-68 dBm
48 Mbps	-68 dBm
24 Mbps	-79 dBm
18 Mbps	-82 dBm

9 Mbps	-87 dBm
6 Mbps	-88 dBm

Two obvious pieces of information that can be extracted from these tables is that OFDM has much better receive sensitivity as well as higher overall rates. If a client has a choice, OFDM will give much better performance. It cannot be assumed that an 802.11g device will always use OFDM however. If there are devices present on the network that use CCK, OFDM devices must go into *protection mode* before using the OFDM rates. Much better overall performance can be achieved if all Wi-Fi devices are restricted to OFDM only. This would improve sensitivity as well as allow higher connection speeds.

NOTE: Removing CCK rates will effectively prevent any 802.11b devices from connecting to the WLAN. Make sure there are no 802.11b devices that need access before disabling CCK.

Background Scanning

Background scanning allows an AP to periodically go off-channel and scan the other channels. This information is used in many ways:

• Gather information to determine optimal channel selection
• Discover neighboring AP candidates for load balancing
• Discover neighboring APs for Opportunistic Key Caching (OKC)
• Discover rogue APs

Background scanning provides many important services – in particular channel selection and OKC are vital for good voice connections. However, when the AP goes off-channel for scanning, it is unable to serve clients. Background scanning is enabled by default with an interval of every 20s. Best practices for Lync deployments should set this to a longer interval of around 60 seconds.

Summary

Microsoft Lync provides an ideal platform for unified communication in the enterprise environment. However, to ensure pleasant user experience, Ruckus WLAN infrastructure should be deployed along with the various configurations listed in this document to optimize Lync traffic.

Appendix A: Sample configuration

Lets consider a sample deployment scenario of Ruckus SmartCell Gateway along with ZoneFlex 7372. The entire configuration of SCG through CLI is given below:

```
Last login: Wed Jul 16 14:27:45 on ttys000
ChandanMac:~ chandan$ ssh admin@12.217.161.208
###############################
#       Welcome to SCG        #
###############################
Password:
Please wait. CLI initializing...

Welcome to the Ruckus SmartCell Gateway 200 Command Line Interface
Version: 2.5.0.0.538

RuckusLabs-SCG> en
Password: *********

RuckusLabs-SCG# config

RuckusLabs-SCG(config)# domain RuckusLabs

RuckusLabs-SCG(config-domain)# zone Microsoft_Lync

RuckusLabs-SCG(config-domain-zone)# background-scan 2.4g 60

RuckusLabs-SCG(config-domain-zone)# background-scan 5g 60

RuckusLabs-SCG(config-domain-zone)# wlan Lync

RuckusLabs-SCG(config-domain-zone-wlan)# priority high

RuckusLabs-SCG(config-domain-zone-wlan)# ofdm-only
The new mgmt-tx-rate: 6mbps

RuckusLabs-SCG(config-domain-zone-wlan)# no roam
Do you want to continue to disable (or input 'no' to cancel)? [yes/no] yes
Successful operation

RuckusLabs-SCG(config-domain-zone-wlan)# ▌
```

The above config makes changes in the Microsoft_Lync zone and all the AP's under it. No additional configuration is required at the AP end.

Another sample deployment scenario of Ruckus Zone Director along with ZoneFlex R500 is shown below. The entire configuration of director through CLI is given below:

```
Last login: Tue Sep 16 09:11:23 on ttys000
Chandan:~ ruckuswireless$ ssh admin@10.3.7.207

Please login: admin
Password:
Welcome to the Ruckus Wireless ZoneDirector 3000 Command Line Interface
ruckus> en
ruckus# config
You have all rights in this mode.
ruckus(config)# services
ruckus(config-services)# background-scan radio-2.4-interval 60
The command was executed successfully.
ruckus(config-services)# background-scan radio-5-interval 60
The command was executed successfully.
ruckus(config-services)# end
Your changes have been saved.
ruckus(config)# wlan Lync
The WLAN service 'Lync' has been loaded. To save the WLAN service, type 'end' or 'exit'.
ruckus(config-wlan)# priority high
The command was executed successfully. To save the changes, type 'end' or 'exit'.
ruckus(config-wlan)# ofdm-only
The mgmt-tx-rate will be set to 6Mbps due to ofdm-only enable.
The command was executed successfully. To save the changes, type 'end' or 'exit'.
ruckus(config-wlan)# no roam
The command was executed successfully. To save the changes, type 'end' or 'exit'.
ruckus(config-wlan)# end
The WLAN service 'Lync' has been updated and saved.
Your changes have been saved.
ruckus(config)# end
Your changes have been saved.
ruckus#
```

The above config makes changes in Lync WLAN and all the AP's broadcasting that WLAN. No additional configuration is required at the AP end.

Appendix B: Recommended Reading

Microsoft Lync

Microsoft Lync Wiki - http://en.wikipedia.org/wiki/Microsoft_Lync

Voice over IP

What is VoIP? - http://www.voip-sip.org/what-is-voip/

"VOIP for Dummies", by Timothy V. Kelly

Latency and QoS for VoIP - http://www.sans.org/reading_room/whitepapers/voip/latency-qos-voice-ip_1349

Introduction to MOS - http://www.voipmechanic.com/mos-mean-opinion-score.htm

Standards and Certifications

VoIP-related protocols and standards - http://www.protocols.com/pbook/voipfamily.htm

WFA Voice-Enterprise - http://www.wi-fi.org/knowledge-center/white-papers/wi-fi-certified%E2%84%A2-voice-enterprise-delivering-wi-fi%C2%AE-voice-enterprise

Troubleshooting

List of popular debug tools - http://www.voip-info.org/wiki/view/How+To+Debug+and+Troubleshoot+VOIP

About Ruckus

Headquartered in Sunnyvale, CA, Ruckus Wireless, Inc. (NYSE: RKUS) is a global supplier of advanced wireless systems for the rapidly expanding mobile Internet infrastructure market. The company offers a wide range of indoor and outdoor "Smart Wi-Fi" products to mobile carriers, broadband service providers, and corporate enterprises, and has over 36,000 end-customers worldwide. Ruckus technology addresses Wi-Fi capacity and coverage challenges caused by the ever-increasing amount of traffic on wireless networks due to accelerated adoption of mobile devices such as smartphones and tablets. Ruckus invented and has patented state-of-the-art wireless voice, video, and data technology innovations, such as adaptive antenna arrays that extend signal range, increase client data rates, and avoid interference, providing consistent and reliable distribution of delay-sensitive multimedia content and services over standard 802.11 Wi-Fi. For more information, visit http://www.ruckuswireless.com.

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