[ ]

INTEROPERABILITY REPORT

Ascom i62

Avaya Wireless LAN Access Points 9122/9123/9132/9133

Avaya version 7.5.2

Ascom i62 and OEM derivatives version 5.4.2

Ascom, Gothenburg

October 2015

TABLE OF CONTENT:

INTRODUCTION 3
About Ascom 3
About Avaya 3
SITE INFORMATION 4
Test Topology 4
SUMMARY 5
Known Issues 6
Compatibility Information 6
General Conclusion 6
TEST RESULTS 7
Ascom WLAN Infrastructure Verification – VoWiFi 7
Test Areas 7
Test Protocol 8
APPENDIX A: TEST CONFIGURATIONS 9
Avaya Wireless LAN Access Points 9122/9123/9132/9133 9
ESS, Radio and QoS settings 9
Setting up WPA2-Enterprise/802.1X 13
Ascom i62 14
Innovaphone IP302 (IP PBX) 15

INTRODUCTION

This document describes necessary steps and guidelines to optimally configure the Avaya WLAN platform with Ascom i62 VoWiFi handsets.

The guide should be used in conjunction with both Avaya and Ascom's configuration guide(s).

About Ascom

Ascom Wireless Solutions is a leading provider of on-site wireless communications for key segments such as hospitals, manufacturing industries, retail and hotels. More than 75,000 systems are installed at major companies all over the world. The company offers a broad range of voice and professional messaging solutions, creating value for customers by supporting and optimizing their Mission-Critical processes. The solutions are based on VoWiFi, IP-DECT, DECT, Nurse Call and paging technologies, smartly integrated into existing enterprise systems.

Founded in the 1950s and based in Göteborg, Sweden, Ascom Wireless Solutions is part of the Ascom Group and listed on the Swiss Stock Exchange. The company has subsidiaries in 10 countries and more than 1,200 employees worldwide.

Information about Ascom Wireless Solutions is available at http://www.ascom.com/ws.

About Avaya

Avaya is a global provider of business collaboration and communications solutions, providing unified communications, contact centers, data solutions and related services to companies of all sizes around the world.

Information about Avaya is available at http://www.avaya.com.

SITE INFORMATION

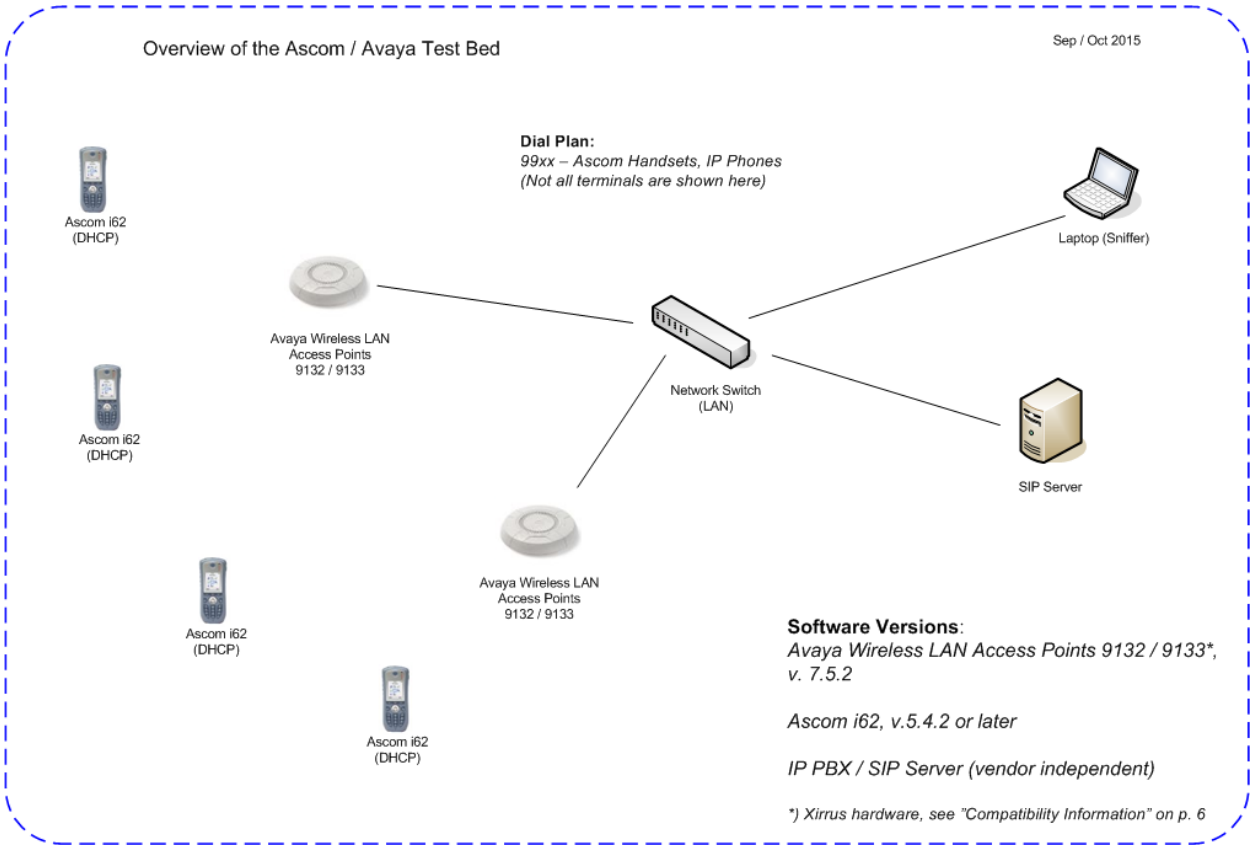
Test Site(s): Ascom Wireless HQ
Gothenburg
Sweden

Participant(s):

Matthew Williams (Ascom HQ, SE)
Ajay Raval (Xirrus Inc., US)

……

Test Topology



SUMMARY

Please refer to the test protocol for detailed results.

WLAN Features

High Level Functionality	Result
Association, Open with No Encryption	OK
Association, WPA-PSK, TKIP	N/A*
Association, WPA2-PSK, AES Encryption	OK
Association, PEAP-MSCHAPv2 Auth., AES Encryption	OK
Association with EAP-TLS authentication	OK
Association, Multiple ESSIDs	OK
Beacon Interval and DTIM Period	OK
Preauthentication	Supported only in autonomous AP mode**
PMKSA Caching	OK
WPA2-opportunistic/proactive Key Caching	OK
WMM Prioritization	OK
802.11 Power-save	OK
802.11e U-APSD	OK
Active Mode (load test)	OK
802.11e U-APSD (load test)	OK

*) WPA can only be used in “mixed mode” (deprecated in 11n/ac)
**) Opportunistic/Proactive Key Caching recommended

Roaming

High Level Functionality	Result
Roaming, Open with No Encryption	OK
Roaming, WPA-PSK, TKIP Encryption	N/A
Roaming, WPA2-PSK, AES Encryption	OK*
Roaming, PEAP-MSCHAPv2 Auth, AES Encryption	OK**

*) Typical roaming time: ~28ms
**) Typical roaming time: ~29ms (OKC enabled)

Known Issues

- Reduced battery lifetime (~30%) when a call is active in UAPSD mode. Considering test results of about nine hours of talk time in UAPSD mode, the impact on real world deployments is anticipated to be marginal.
- Ascom i62 will use an incorrect Tx power when the regulatory domain is set statically. e.g. “ETSI” or “USA”. This is due to a problem handling the “Power Constraint” information element (802.11h) and will be corrected in the next release (Ascom ticket no: ASCOM-292).
  Workaround: Make sure the network parameter “Regulatory domain” set to “World mode (802.11d)”.

For additional information regarding known issues, please contact interop@ascom.se.

Compatibility Information

Interoperability validation at Ascom in Gothenburg was carried out in an environment involving Xirrus XR-620/630 Access Points running software version 7.5.0. According to the manufacturer, this hardware is identical to Avaya Wireless LAN Access Points 9122/9123/9132/9133, hence making this report applicable to those particular APs on condition that they’re running Avaya’s equivalent software version of 7.5.2.

Ascom i62 version 5.4.2 incorporates WLAN driver version 3.6.h.

The following hardware is supported:

Compatible Access Points
Avaya Wireless LAN Access Point 9122
Avaya Wireless LAN Access Point 9123
Avaya Wireless LAN Access Point 9132
Avaya Wireless LAN Access Point 9133

Note: This report is valid for Ascom i62 and OEM variants.

General Conclusion

With the exception of listed “Known Issues”, all verified test areas, such as authentication/association, handover and call stability, produced good results. The Voice over Wi-Fi roaming experience, irrespective of employing PSK and 802.1X authentication, was fully acceptable from the user perspective.

As indicated on the previous page, outcomes of load tests were also satisfactory. In both active and U-APSD modes, it was possible to maintain twelve simultaneous calls per AP without any noticeable deterioration of voice quality. This number was not imposed by a limitation of capacity, but rather phones available at the time of testing. Ascom considers a baseline of ten calls per AP to be quite adequate for most deployments.

From the perspective of security, Ascom’s recommendation is always to employ the strongest available authentication and encryption combination. In practically all deployments, this would imply use of WPA2 and AES-CCMP exclusively.

TEST RESULTS

Ascom WLAN Infrastructure Verification – VoWiFi

Software Versions:

- Avaya software v 7.5.2
- Ascom i62 v 5.4.2 or later (WLAN driver version 3.6.h)

Signaling Protocol:

- SIP, Innovaphone IP302 used as SIP server (version 10 sr22)

Configuration of WLAN System:

- Beacon Interval: 100TU (TU = 1,024 microseconds)
- DTIM Period: 5
- 802.11b/g/n: Channel(s) 1, 6 (802.11b-rate enabled: 11 Mbps)
- 802.11a/n/ac: Channel(s) 40, 48
- WMM/ U-APSD Enabled
- 802.11d Regulatory Domain: SE

Ascom i62 Configuration:

- World Mode Regulatory Domain set to World mode (802.11d)
- IP DSCP for Voice: 0x2E (46) – Expedited Forwarding 46
  (default mapping enabled on Access Points, see “Appendix A”)
- IP DSCP for Signaling: 0x1A (26) – Assured Forwarding 31; alt. Best Effort 0x00
- Transmit Gratuitous ARP: Enable
- Roaming Methodology: 802.11 Roaming

Keep in mind that security options and power save modes were adjusted according to requirements in individual test cases. Please refer to appendix A for information regarding device configuration.

Test Areas

Association and Authentication: 100% pass

- APs can support DFS channels in 802.11 a/n/ac mode (see Ascom’s guidelines on p. 16)

Power Save and QoS: 100 % pass

- DSCP for voice set to EF46
- Default WMM-DSCP map enabled on WLAN system (see “Appendix A”)

“Performance”: 100% pass

- 12 active calls per single radio verified in active and U-APSD modes

Roaming and Handover Times: 100% pass

- Typical roaming latency: ~30ms (WPA2, OKC enabled)
- Pre-Authentication supported only in autonomous AP mode (not recommended)

Battery Lifetime: 100% pass

- >95.5hrs in idle mode
- >4hrs in-call in active mode
- >9.5hrs in-call in U-APSD mode

Stability: 100% pass

- Stable calls for the duration of >24hrs verified in active and U-APSD modes

802.11n features: 100% Pass

- Channel bonding in 802.11b/g/n mode is not recommended by Ascom

Metrics do not account for “see comments” and “untested” cases.

Test Protocol

Ascom VoWIFI

Pass	24(23)*
Fail	0
Comments	3(4)*
Untested	6
Total	33(33)*

*) a/n/ac (b/g/n)

WLAN Test Protocol

Miscellaneous

Test specifications are available for scrutiny on Ascom’s interoperability web page (requires login).

URL: https://www.ascom-ws.com/AscomPartnerWeb/en/startpage/Sales-tools/Interoperability

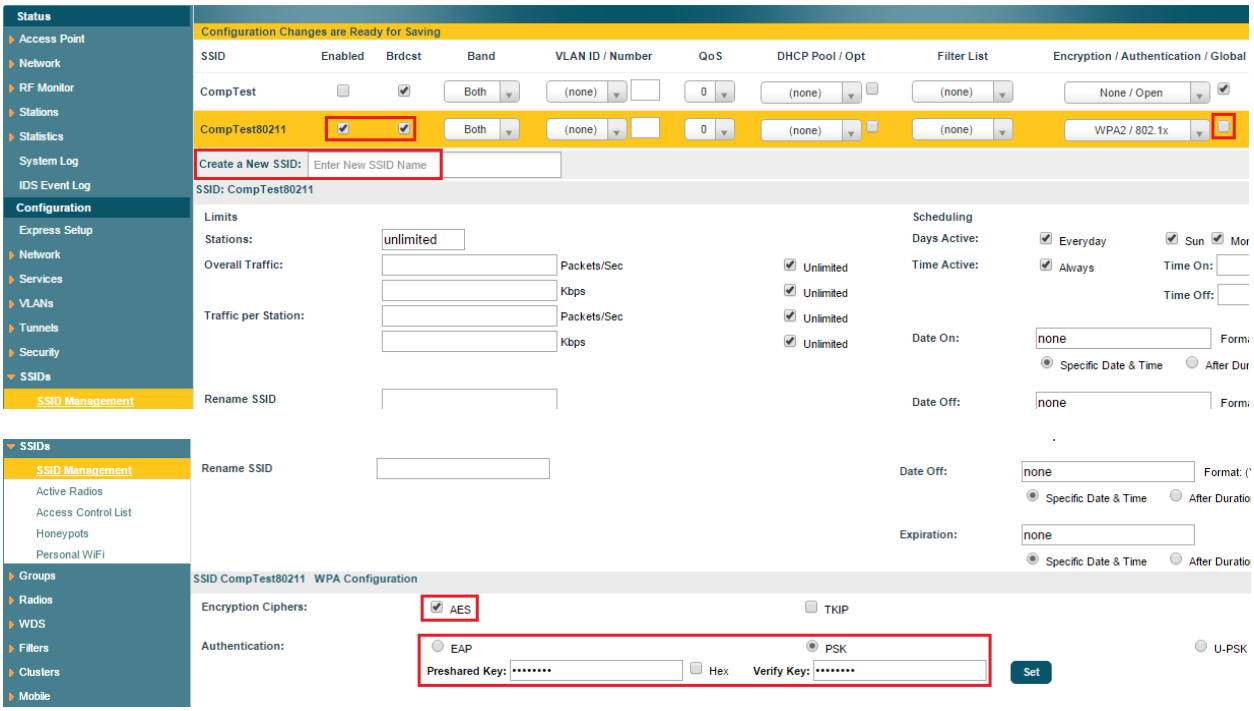
APPENDIX A: TEST CONFIGURATIONS

Avaya Wireless LAN Access Points 9122/9123/9132/9133

In the following appendix, you will find screenshots and explanations of basic settings in order to get the Avaya WLAN operational with Ascom i62. Please note that APs were managed through their respective GUIs during interoperability validation.

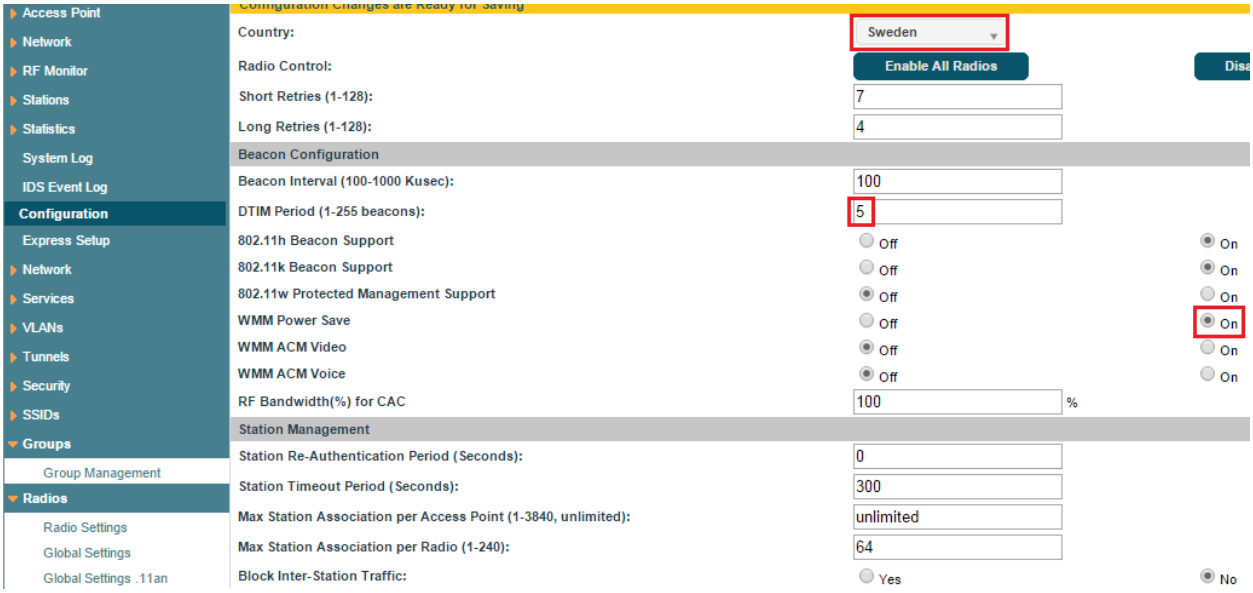
As reference, configuration files are included at the end of each section.

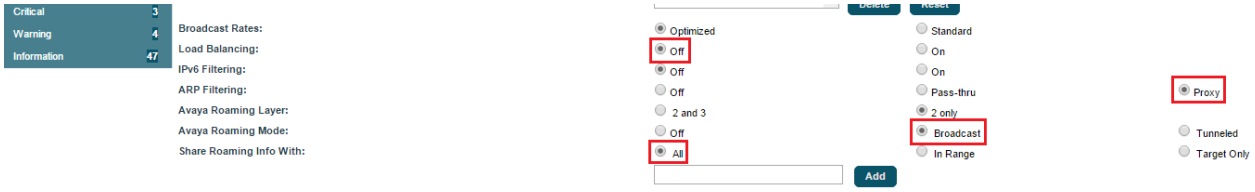
ESS, Radio and QoS settings



SSIDs > SSID Management

- The screen shots above serve as a baseline for ESSID settings with WPA2-PSK security
- It is recommended that the Encryption/Authentication/Global setting is “unchecked”





Radios > Global Settings

- Select the correct 802.11d Regulatory Domain (or “Country”).
- Ascom recommends a DTIM Period of “5” (lower values will negatively impact battery lifetime)
- Make sure WMM Power Save is enabled
- In VoWiFi deployments, the WLAN manufacturer recommends “Load Balancing” set to “Off”
- Reduce ARP traffic by setting “ARP filtering” to “Proxy”
- To share roaming information with other APs, set “Roaming Mode” to “Broadcast” and “Share Roaming Info With” to “All”

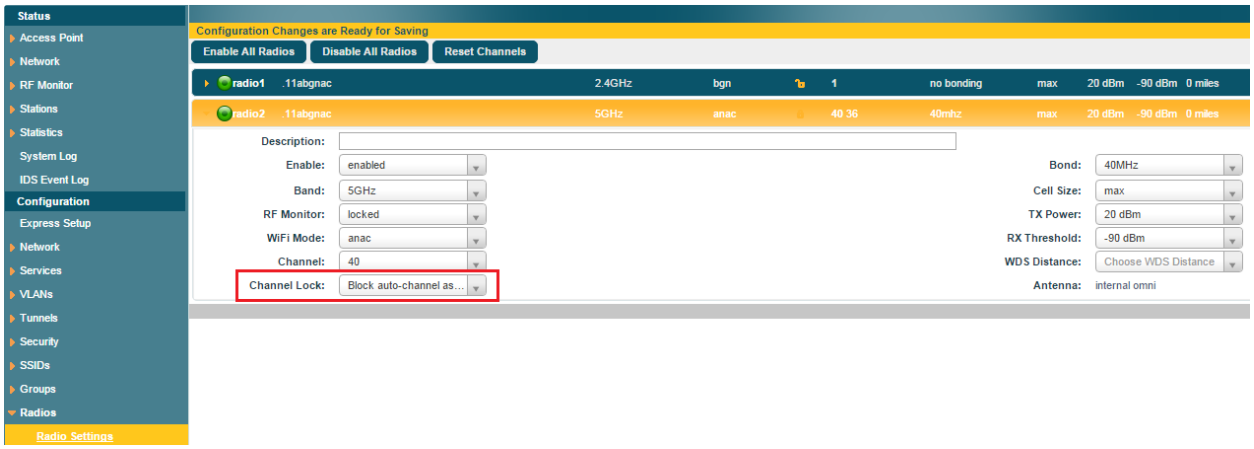
Opportunistic key caching/proactive key caching (enabled by default) will work given that APs are configured to talk to each other.

Note[1]: WMM Power Save (U-APSD) is strongly recommended since it will boost the battery performance dramatically.

Note[2]: The Ascom i62 does not support 802.11k/v/r/w. These new amendments to 802.11 are “backwards-compatible” with previous standards.

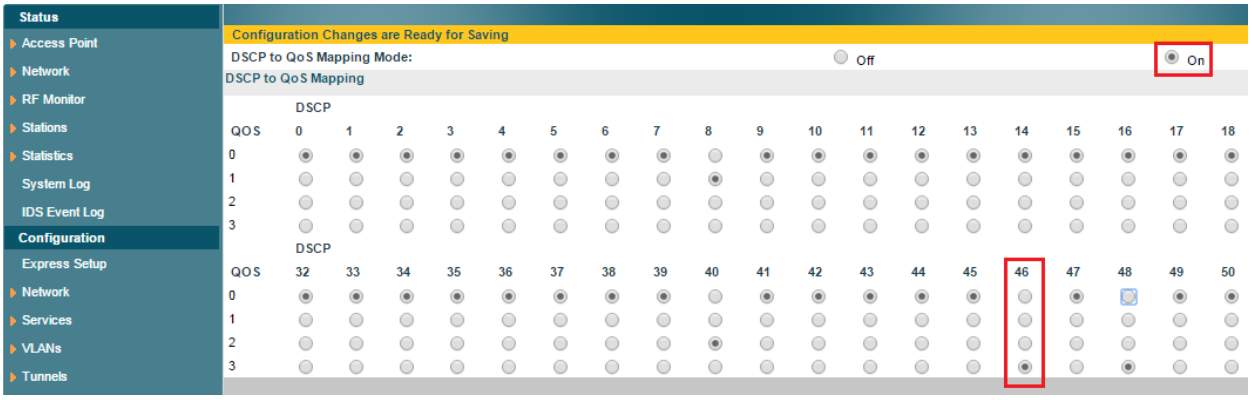
Radios > Advanced RF Settings

- In VoWiFi deployments, the WLAN manufacturer recommends that the “RF Monitor Mode” is turned “Off”



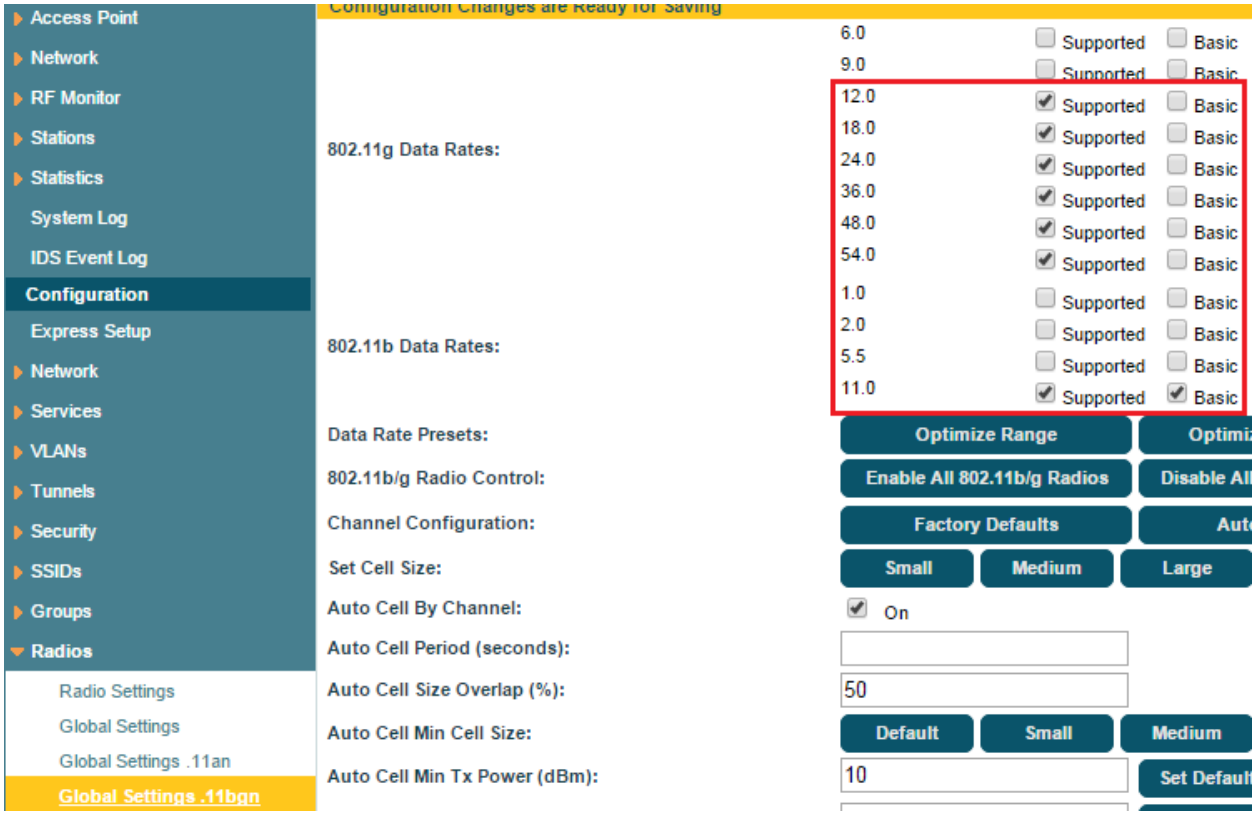
Radios > Radio Settings

- Disable auto-channel by setting “Channel Lock” to “Block auto-channel assignment”



Radios > DSCP Mappings

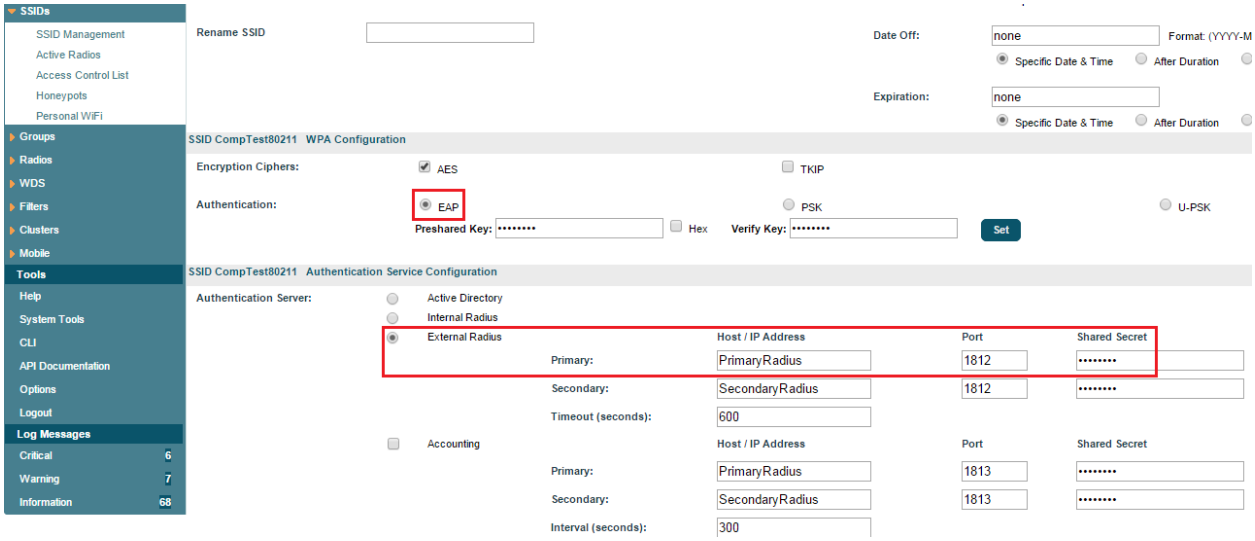
- Make sure that “DSCP to QoS Mapping Mode” is enabled and the Expedited Forwarding PHB (EF 46) is mapped to the highest priority queue



Radios > Global Settings .11bgn

- The screen shot above serves as a baseline for 802.11b/g/n radio settings. Ascom recommends disabling the lowest data rates to improve overall capacity in the radio cell.
- The remaining radio interfaces: 11an, 11n and 11ac were left at their default settings
- See page16 for guidelines regarding DFS-channels in the 5GHz band

Setting up WPA2-Enterprise/802.1X



SSIDs > SSID Management

- Select “EAP” as authentication method
- Enter the IP address and shared secret of the external RADIUS server

Note[1]: Both root and client certificates are required for TLS. Otherwise, only the root certificate will suffice.

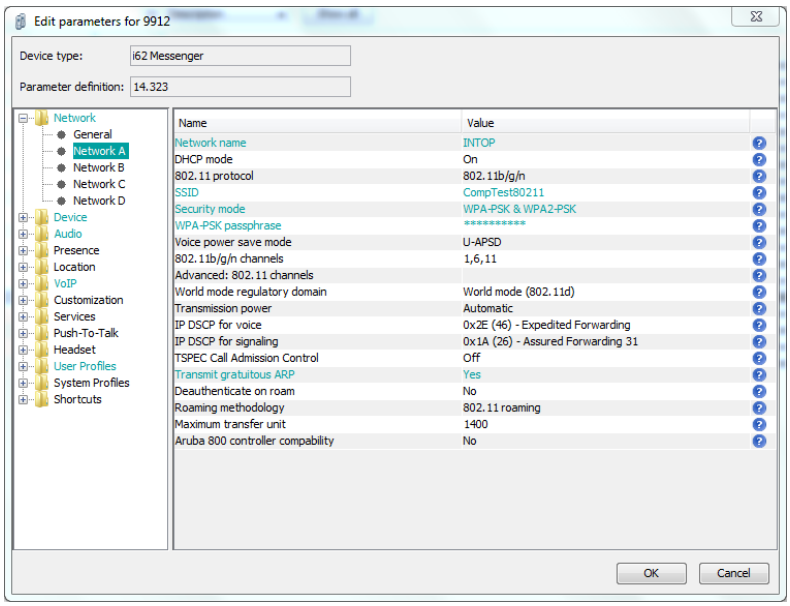
Note[2]: “WPA2 opportunistic key caching” is recommended when roaming between access points. Without key caching, a full EAP exchange is executed every time the handset roams, which may degrade the user experience during an active call.

Please refer to Avaya’s documentation for additional guidance and explanations.

WLAN Configuration:

WLAN Configuration

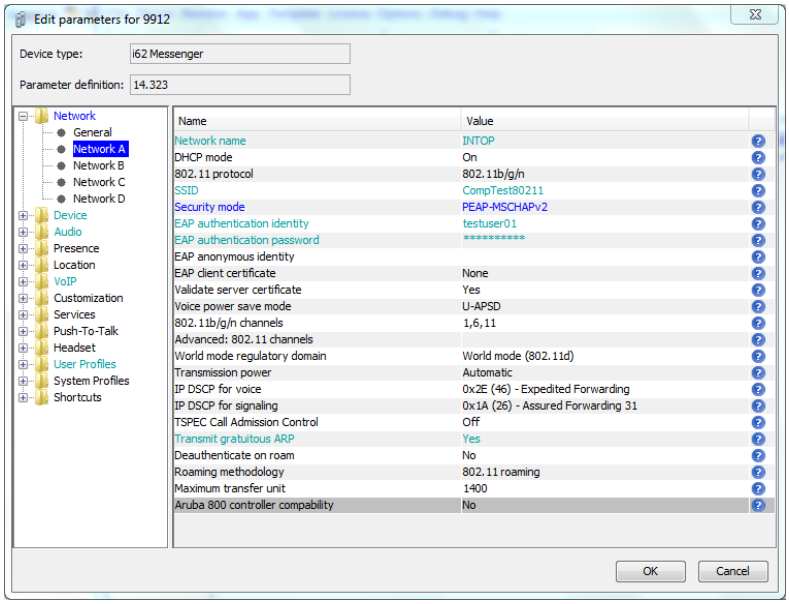
Ascom i62



Ascom i62 Network configuration (WPA2-PSK)

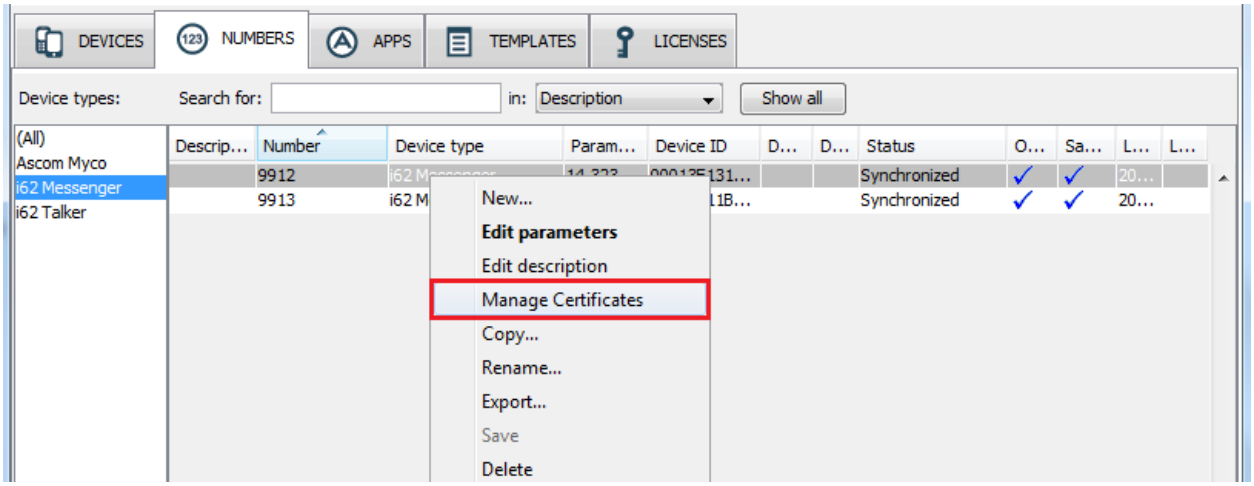
TSPEC Call Admission Control is enabled by changing the value “Off” to “Required”.

Ascom supports only three channel deployments using channels 1, 6 and 11.
For 802.11a/n/ac, use channels according to the infrastructure manufacturer and country regulations.



Ascom i62 network configuration for 802.1X authentication (PEAP-MSCHAPv2)

Server certificate validation can be overridden in Ascom i62 version 4.1.12 and later.



If 802.1X Authentication is used a root certificate has to be uploaded to the phone by “right clicking” - > Edit certificates in Ascom Device Manager. EAP-TLS will require both a root and a client certificate.

Please refer to Ascom’s documentation for additional explanations and guidance.

Ascom i62 Template:

Ascom i62 Template

Innovaphone IP302 (IP PBX)

Innovaphone IP302 acted as SIP server and was configured with a static IP address.

Disclaimer: In the real world, call signaling and voice should be an integral part of any QoS policy. In this report, however, signaling protocols are less relevant since testing focuses on interoperability in relation to the WLAN infrastructure and not features of the IP PBX.

IP302 Configuration:

IP302 Configuration

General guidelines when deploying Ascom i62 handsets in 802.11a/n/ac environments:

1. *Enabling more than eight channels will degrade roaming performance. Ascom recommends against going above this limit.*

2. *Using 40 MHz channels (or "channel-bonding") will reduce the number of non-DFS* channels to two in ETSI regions (Europe). In FCC regions (North America), 40MHz is a more viable option because of the availability of additional non-DFS channels. The handset can co-exist with 40MHz stations in the same ESS.*

3. *Ascom does support and can coexist in 80MHz channel bonding environments. The recommendation is however to avoid 80MHz channel bonding as it severely reduces the number of available non-overlapping channels.*

4. *Make sure that all non-DFS channel are taken before resorting to DFS channels. The handset can cope in mixed non-DFS and DFS environments; however, due to "unpredictability" introduced by radar detection protocols, voice quality may become distorted and roaming delayed. Hence Ascom recommends if possible avoiding the use of DFS channels in VoWIFI deployments.*

*) Dynamic Frequency Selection (radar detection)

Document History

Rev	Date	Author	Description
PA1	2015-09-30	SEMW	Initial draft
PA2	2015-10-05	SEMW	Draft ready for review
A	2015-10-08	SEMW	RevA
PB1	2015-12-15	SEMW	Addition of WAP9122/WAP9123
B	2015-12-15	SEMW	RevB