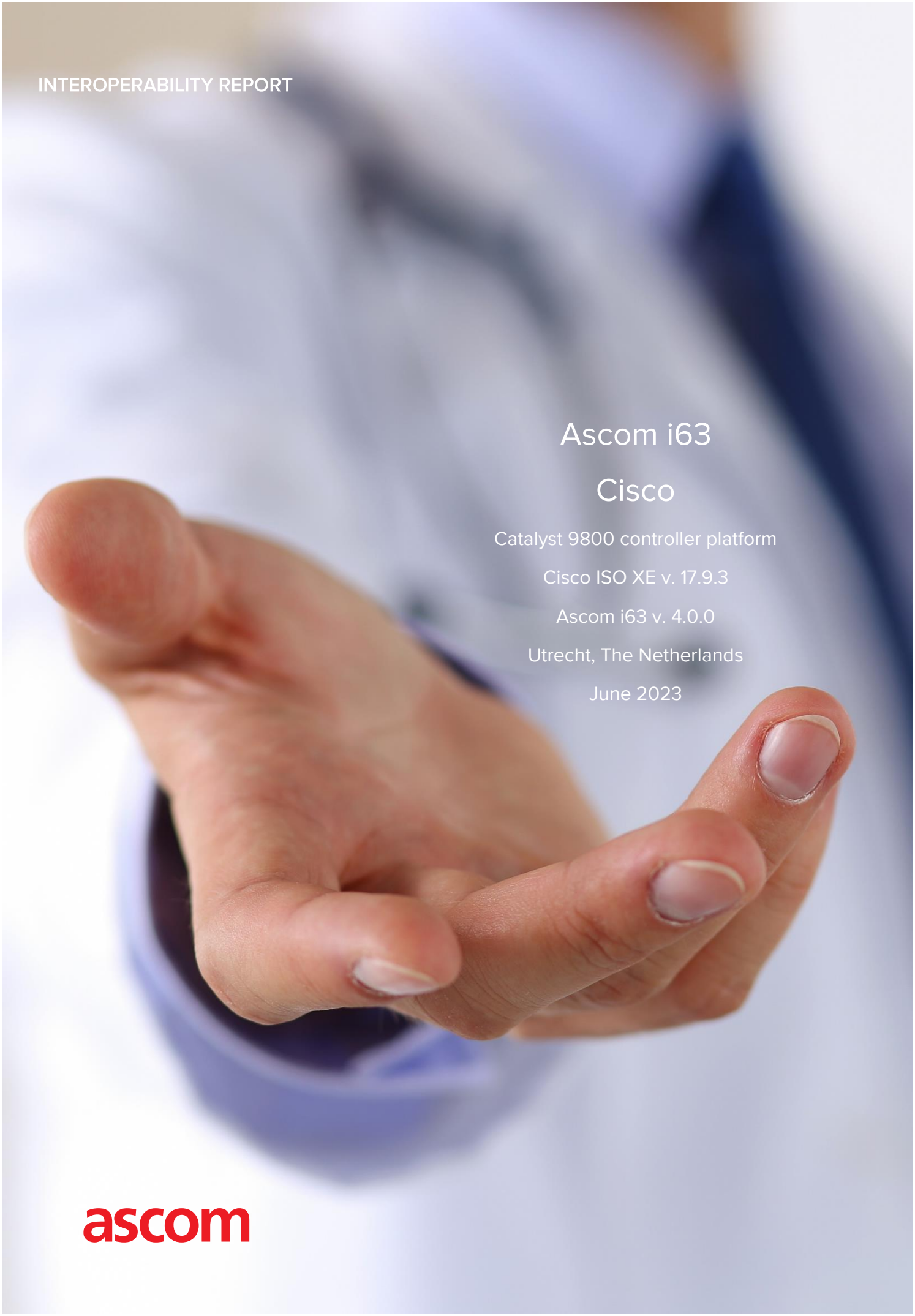
INTEROPERABILITY REPORT



Ascom i63

Cisco

Catalyst 9800 controller platform

Cisco ISO XE v. 17.9.3

Ascom i63 v. 4.0.0

Utrecht, The Netherlands

June 2023

ascom

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Introduction

This document describes a summary of the interoperability validation results of the Ascom and Cisco platform, furthermore it provides the necessary steps and guidelines to optimally configure the respective platforms. This report should be used in conjunction with configuration guides from both Cisco and Ascom.

About Ascom

Ascom is a global solutions provider focused on healthcare ICT and mobile workflow solutions. The vision of Ascom is to close digital information gaps allowing for the best possible decisions – anytime and anywhere. Ascom's mission is to provide mission-critical, real-time solutions for highly mobile, ad hoc, and time-sensitive environments. Ascom uses its unique product and solutions portfolio and software architecture capabilities to devise integration and mobilization solutions that provide truly smooth, complete, and efficient workflows for healthcare as well as for industry, security and retail sectors.

Ascom is headquartered in Baar (Switzerland), has operating businesses in 18 countries and employs around 1,300 people worldwide. Ascom registered shares (ASCN) are listed on the SIX Swiss Exchange in Zurich.

About Cisco

Cisco (NASDAQ: CSCO) is the worldwide technology leader that has been making the Internet work since 1984. Our people, products and partners help society securely connect and seize tomorrow's digital opportunity today. Discover more at thenetwork.cisco.com and follow us on Twitter at @Cisco.

Site Information

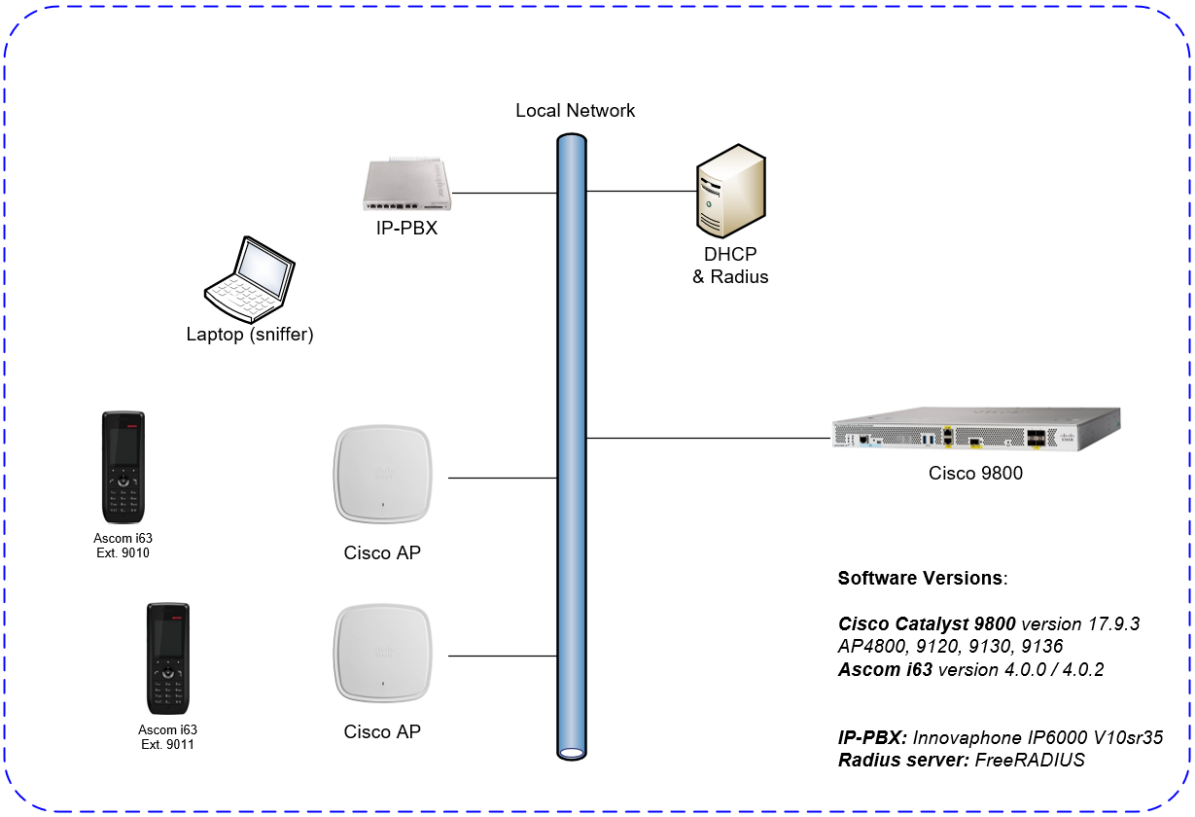
Test site

Ascom Nederland
Orteliuslaan 982
3528 BD Utrecht
The Netherlands

Participants

Remco van den Pangaart, Ascom, Nederland

Test topology



Summary

General conclusions

This Ascom interoperability validation produced good results with regard to the tested areas of authentication, stability, roaming, QoS and power save. WPA3 (Personal and Enterprise) was left out of the test due to known issues.

To maintain optimal roaming performance with WPA2, it is necessary to enable Fast Roaming (FT) both when using PSK and 802.1X based Authentication.

Compatibility information

One Access point model from every product generation has been selected as a representation (AP 4800, 9120, 9130 and 9136). By testing these access points we are considered to cover all supported major Cisco access points based on chipset compatibility listed below.

Supported Partner Access Points with SW version 17.9.3:

AP1832, 1852

AP2802, 3802, 4800

AP 9115, 9117, 9120, 9130, 9136

Supported Partner Controller Platforms with SW version 17.9.3:

Cisco Catalyst 9800-80 Wireless Controller

Cisco Catalyst 9800-40 Wireless Controller

Cisco Catalyst 9800 Wireless Controller for Cloud

Cisco Catalyst 9800 Embedded Wireless Controller for Switch

Cisco Catalyst 9800-L Wireless Controller

Verification overview

WLAN Compatibility and Performance

High Level Functionality	Result	Comments
Association, Open with No Encryption	OK	
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	
PMKSA Caching	OK	
WPA2-opportunistic/proactive Key Caching	OK	
WMM Prioritization	OK	
802.11 Power-save mode	OK	
802.11e U-APSD	OK	
Roaming, WPA2-PSK, AES Encryption	OK	Typical roaming time 51ms
Roaming, WPA2-PSK, AES Encryption, 802.11r/FT	OK	Typical roaming time 26ms
Roaming, PEAP-MSCHAPv2 Auth, AES Encryption	OK	Typical roaming time 40ms
Roaming, PEAP-MSCHAPv2 Auth, AES Encryption, 802.11r/FT	OK	Typical roaming time 36ms
Channel usage controlled by 802.11k	OK	

Average roaming times are measured using 802.11a/n/ac. Refer to Appendix B for detailed test results.

Known limitations

Description and Consequence	Workaround	Ticket(s) raised

For additional information regarding the known limitations please contact **interop@ascom.com** or **support@ascom.com**.

For detailed verification results, refer to Appendix B: Interoperability Validation Records.

Appendix A: Validation Configurations

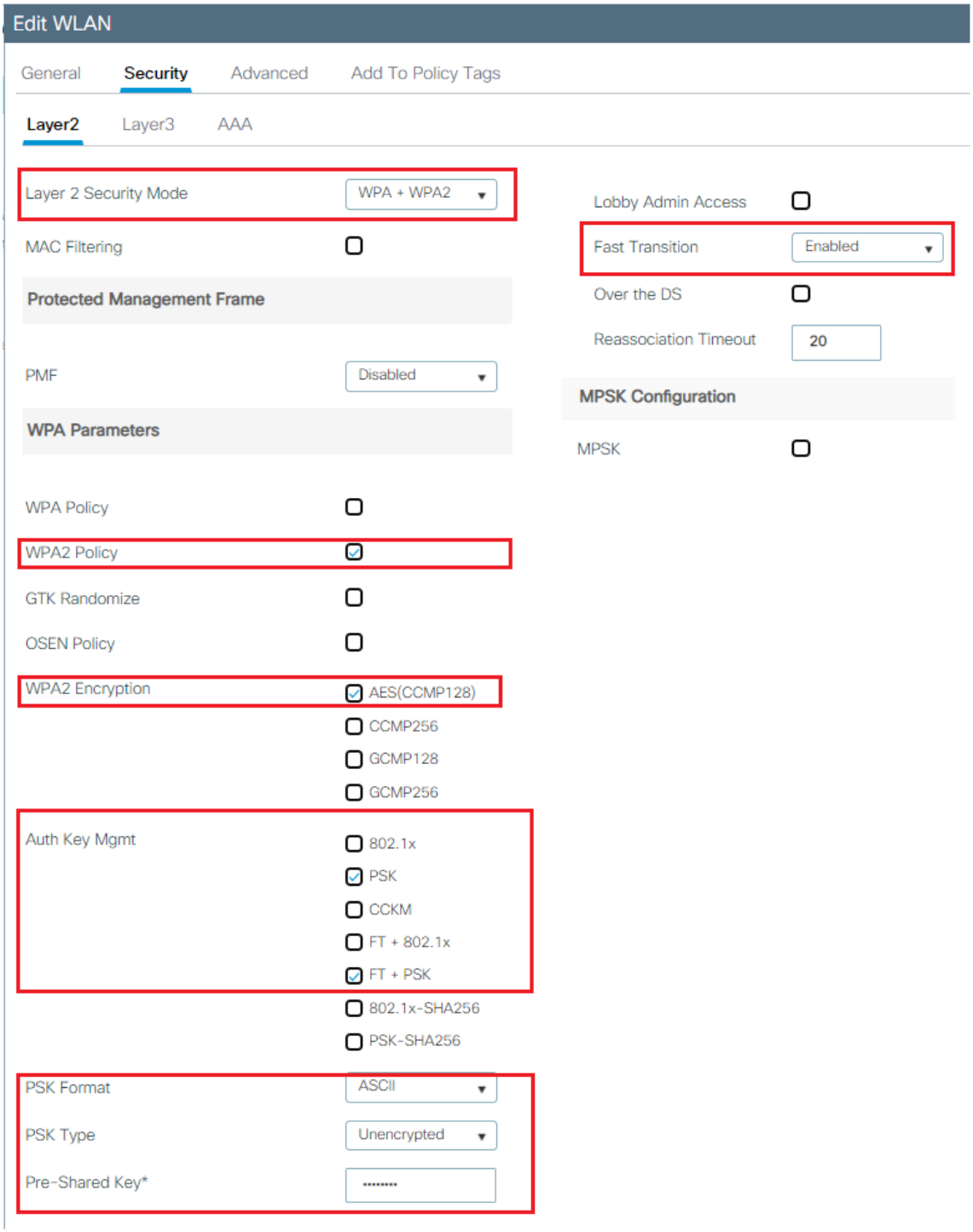
Cisco Catalyst 9800 platform Version 17.9.3

In the following chapter you will find screenshots and explanations of basic settings to get a Cisco 9800 WLAN system to operate with an Ascom i63. Please note that security settings were modified according to requirements in individual test cases.

WLAN settings

WLAN overview

WLAN PSK configuration



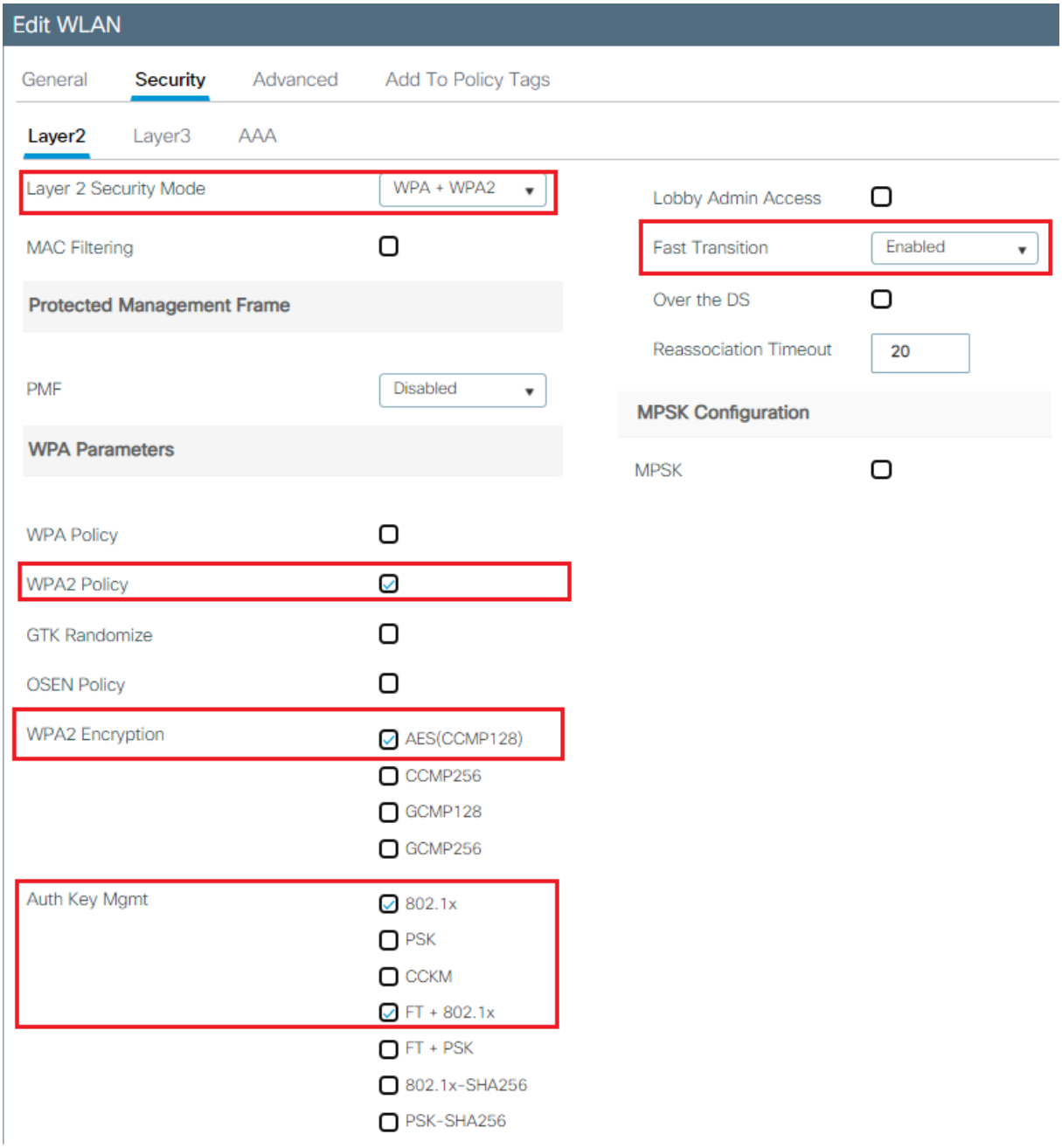
Example of how to configure the system for PSK (WPA2-AES)

Security profile WPA2-PSK, AES encryption

- Select WPA2 Policy with AES encryption.
- Select PSK and enter a key (Here in ASCII format)
- It is strongly recommended to use Fast Transition (802.11r) for enhanced roaming performance.
- Select both PSK and FT+PSK for compatibility with i62 and Myco 1 & 2 on the same SSID.

Compatibility Note. 802.11r is not supported by Ascom i62 and Myco 1 & 2 but the devices have no problem operating on a SSIDs where 802.11r (FT) is advertised in conjunction with a legacy method.

WLAN 802.1X authentication (PEAP-MSCHAPv2).

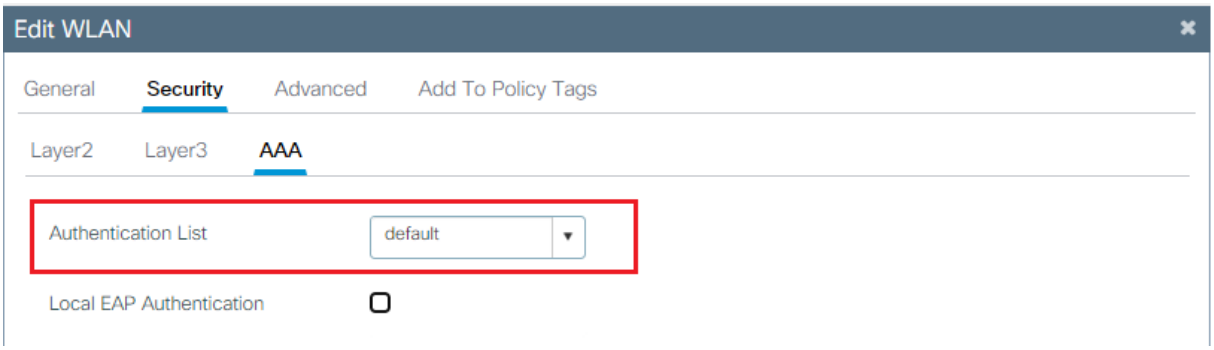


Example of how to configure the system for .1X authentication.

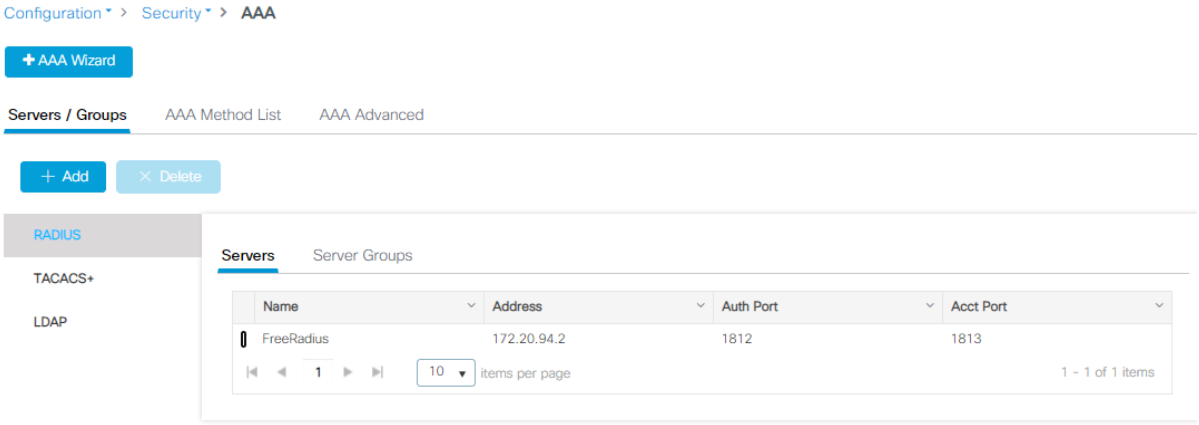
Configuration of authentication using external Radius server, 802.1X. In this example is WPA2-AES used. Select 802.1X as Authentication Key Management.

- Select WPA2 Policy with AES encryption.
- It is strongly recommended to use Fast Transition (802.11r) for enhanced roaming performance.
- Select both 802.1X and FT + 802.1X for compatibility with i62 and Myco 1 and 2 on the same SSID.

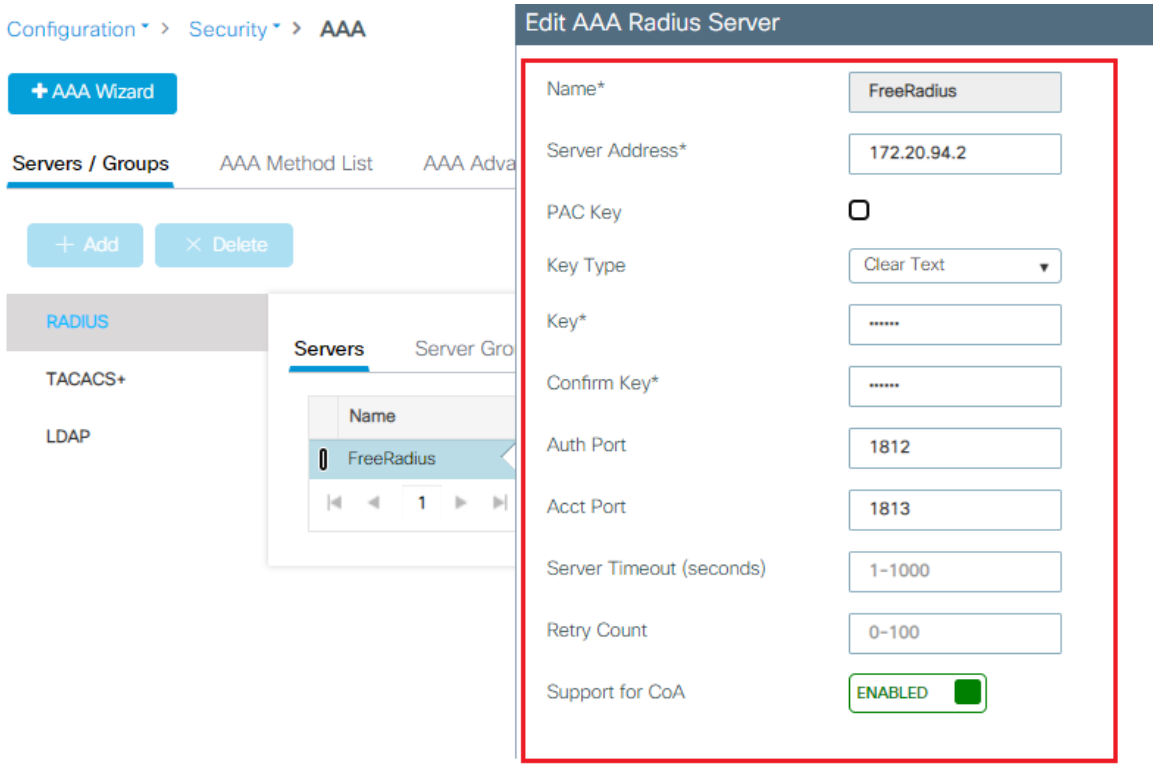
Compatibility Note: 802.11r is not supported by Ascom i62 and Myco 1 & 2 but the devices have no problem operating on a SSIDs where 802.11r (FT) is advertised in conjunction with a legacy method.



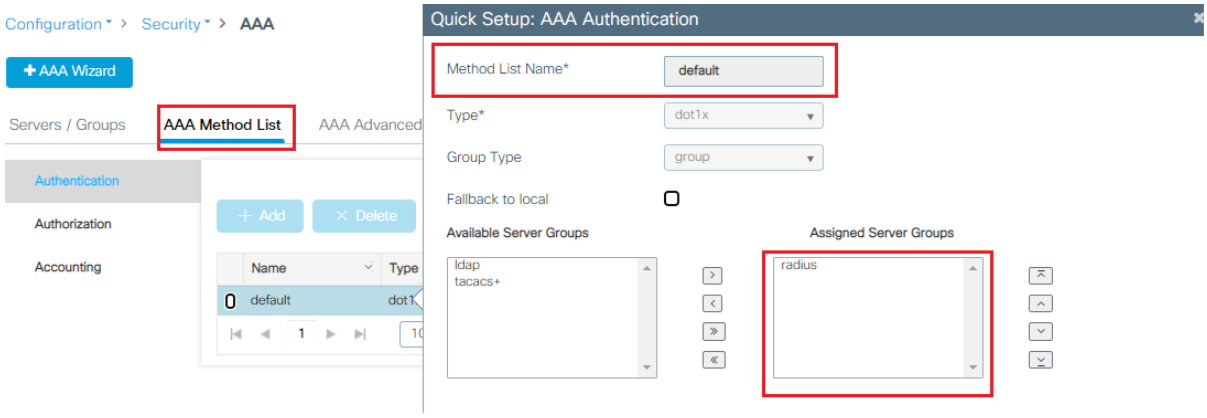
Example of authentication configuration using external Radius server. Select the Authentication list. The server is configured under tab Security/Radius. See configuration of server below.



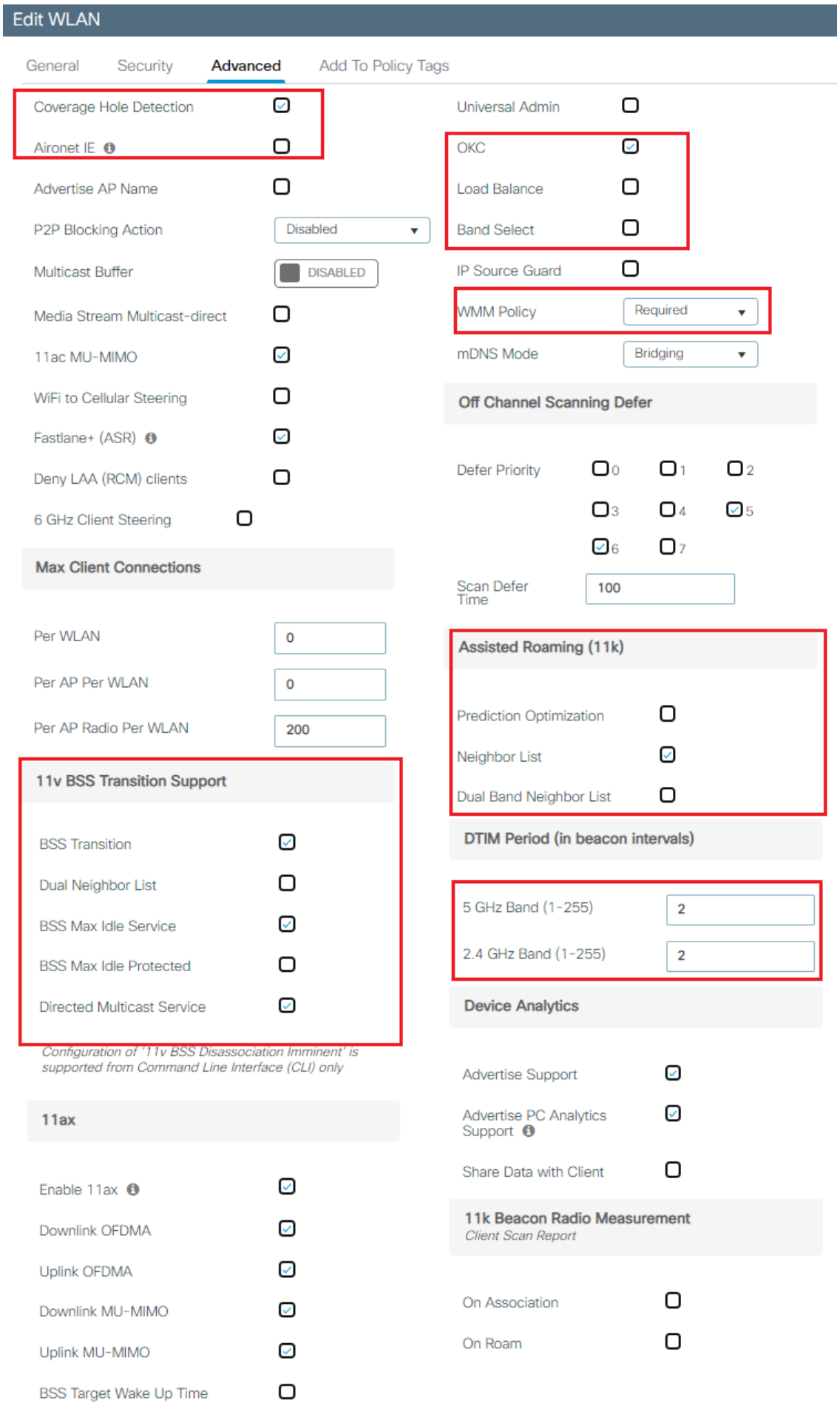
AAA overview



Configuration of RADIUS server. The IP address and the secret must correspond to the IP and the credential used by the Radius server. Tests were performed using FreeRadius as RADIUS server.

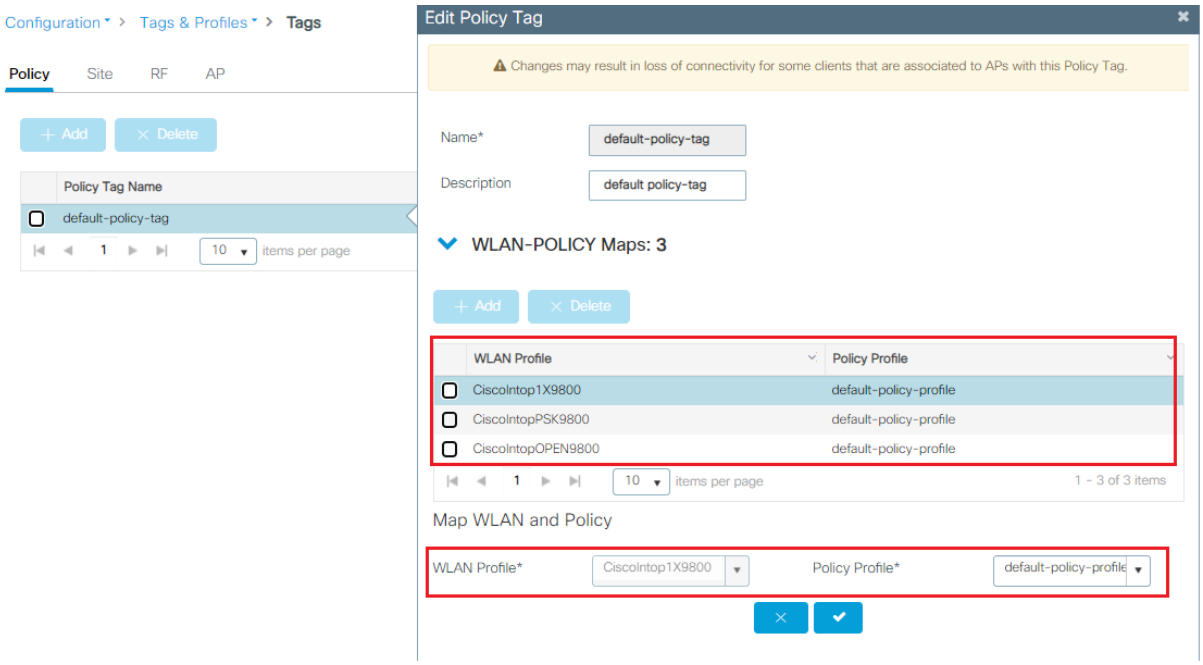


Assign radius server to Method List (default)

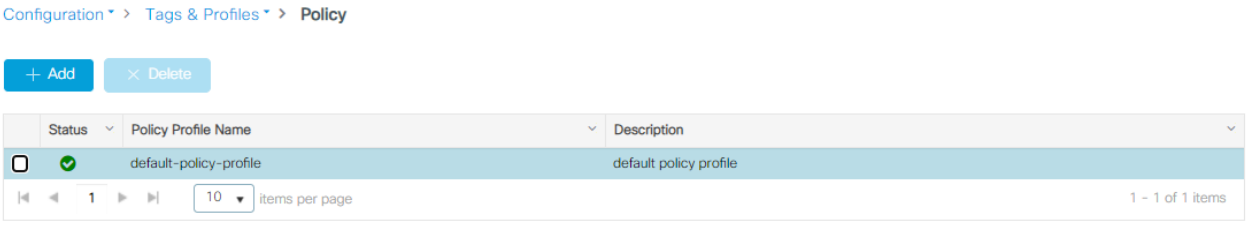

Edit WLAN
General
Security
Advanced
Add To Policy Tags
Coverage Hole Detection
Aironet IE
Advertise AP Name
P2P Blocking Action
Disabled
Multicast Buffer
DISABLED
Media Stream Multicast-direct
11ac MU-MIMO
WiFi to Cellular Steering
Fastlane+ (ASR)
Deny LAA (RCM) clients
6 GHz Client Steering
Max Client Connections
Per WLAN
0
Per AP Per WLAN
0
Per AP Radio Per WLAN
200
11v BSS Transition Support
BSS Transition
Dual Neighbor List
BSS Max Idle Service
BSS Max Idle Protected
Directed Multicast Service
Configuration of '11v BSS Disassociation Imminent' is supported from Command Line Interface (CLI) only
11ax
Enable 11ax
Downlink OFDMA
Uplink OFDMA
Downlink MU-MIMO
Uplink MU-MIMO
BSS Target Wake Up Time
Universal Admin
OKC
Load Balance
Band Select
IP Source Guard
WMM Policy
Required
mDNS Mode
Bridging
Off Channel Scanning Defer
Defer Priority
0
1
2
3
4
5
6
7
Scan Defer Time
100
Assisted Roaming (11k)
Prediction Optimization
Neighbor List
Dual Band Neighbor List
DTIM Period (in beacon intervals)
5 GHz Band (1-255)
2
2.4 GHz Band (1-255)
2
Device Analytics
Advertise Support
Advertise PC Analytics Support
Share Data with Client
11k Beacon Radio Measurement
Client Scan Report
On Association
On Roam

- Coverage Hole Detection can be left enabled if RRM is used in the system.
- Aironet IE is not needed.
- Ascom recommends a DTIM period of at least 2 but no higher than 5.
- Make sure Client Load Balancing and Client Band select is disabled.
- Make sure 11k – Neighbor list is enabled. (Default settings)
- 11v BSS Transition Support is not supported by Ascom i63 but can be left enabled per default configuration.

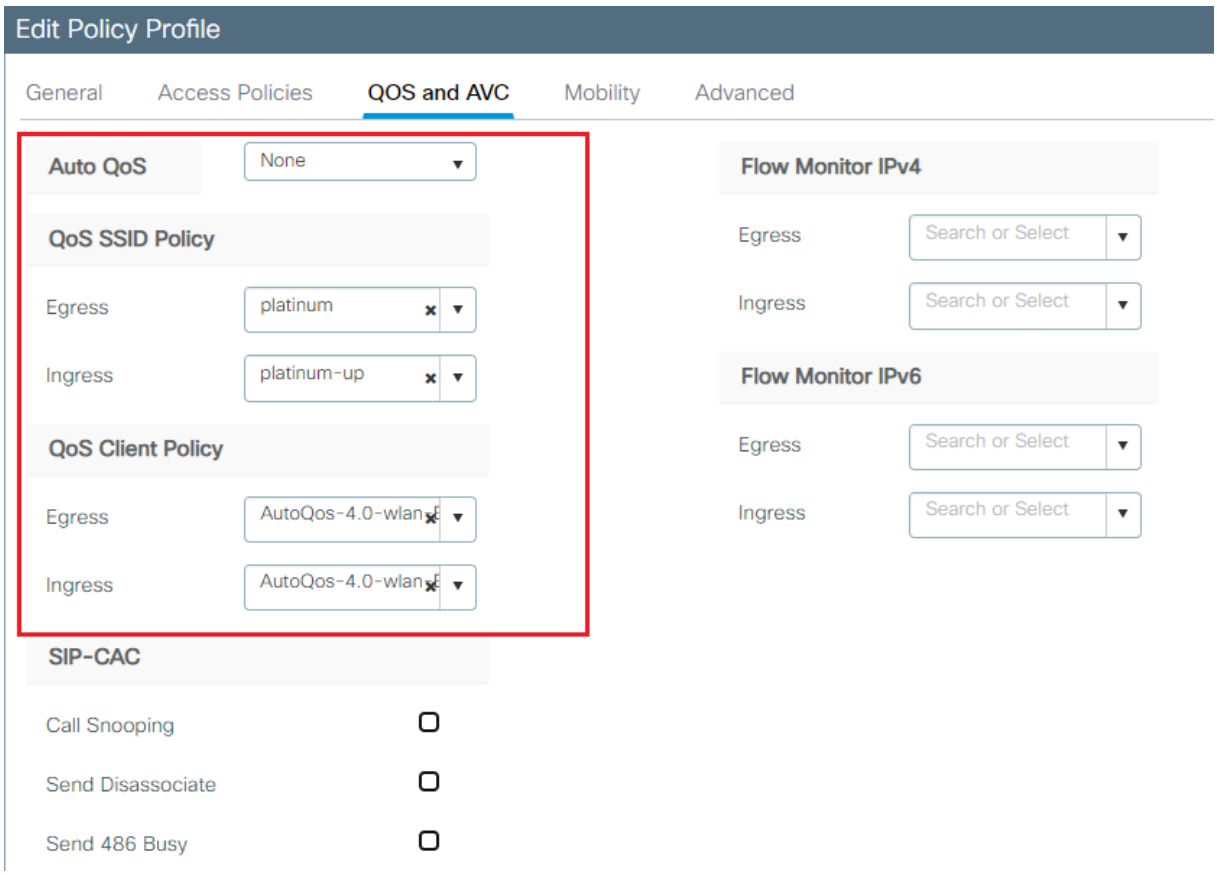
Policy and general settings (QoS, Radio)



Assign your policy profile to WLAN. (Here default-policy-profile). See next step for policy profile settings.

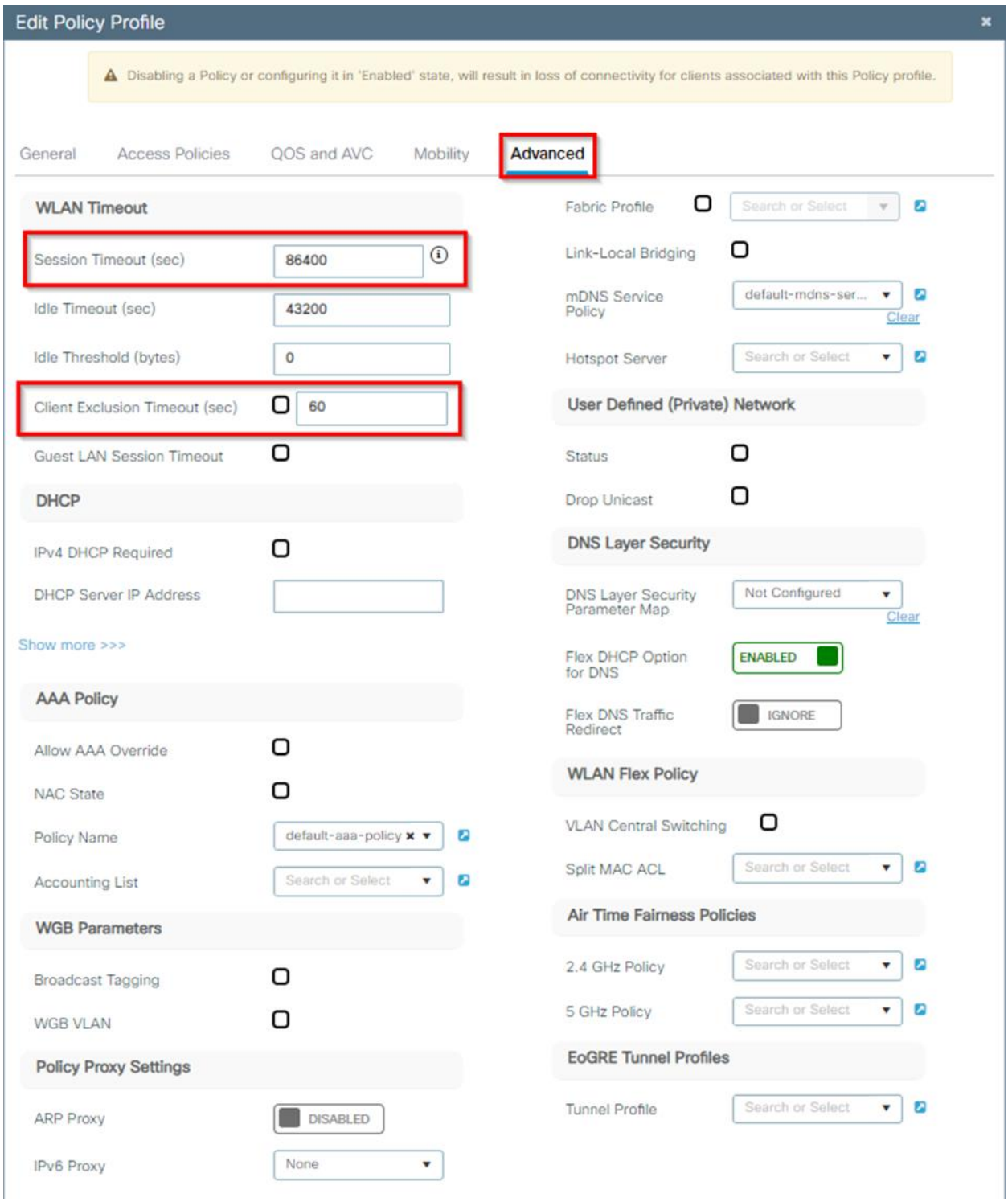


Policy overview



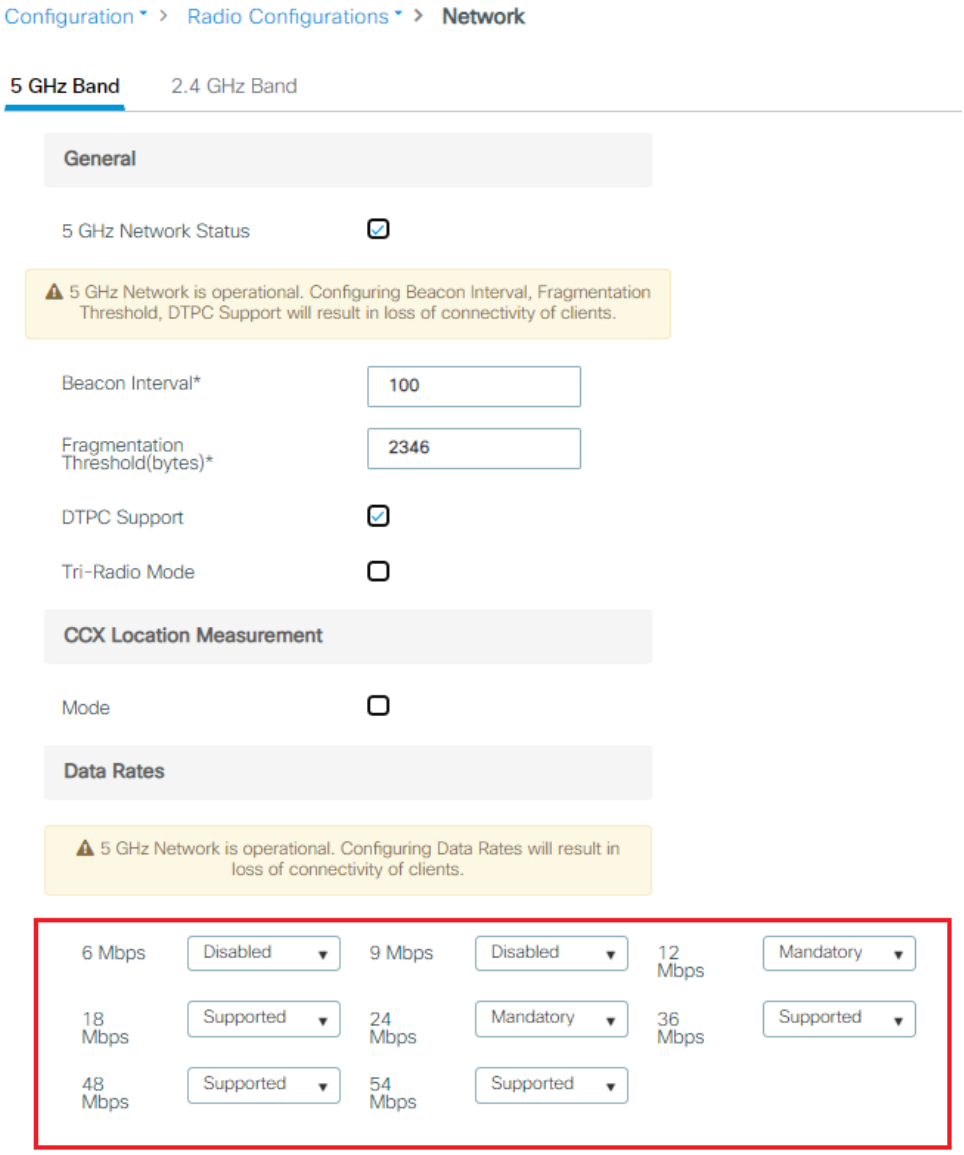
QoS and AVC settings

- Set Auto QoS to none.
- Set QoS SSID Policy Egress to “platinum” and ingress value to “platinum-up”.
- Set QoS Client Policy Egress to “AutoQoS-4.0-wlan-ET-SSID-Output-policy” and ingress to “AutoQoS-4.0-wlan-ET-SSID-Input-AVC-policy”.



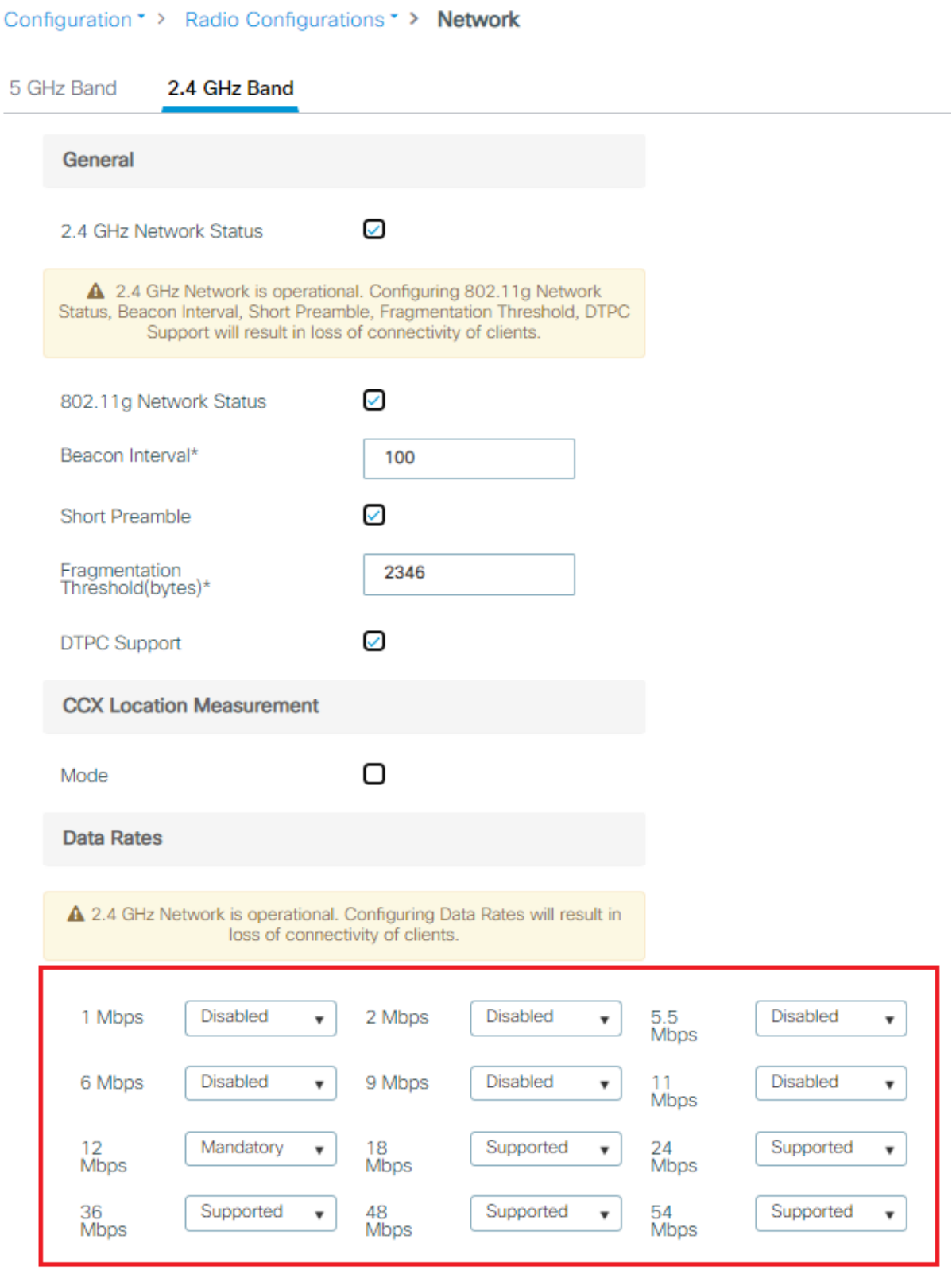
- Make sure “Session timeout” is set to a very large value.
- Disable Client Exclusion Timeout.

Network Settings and



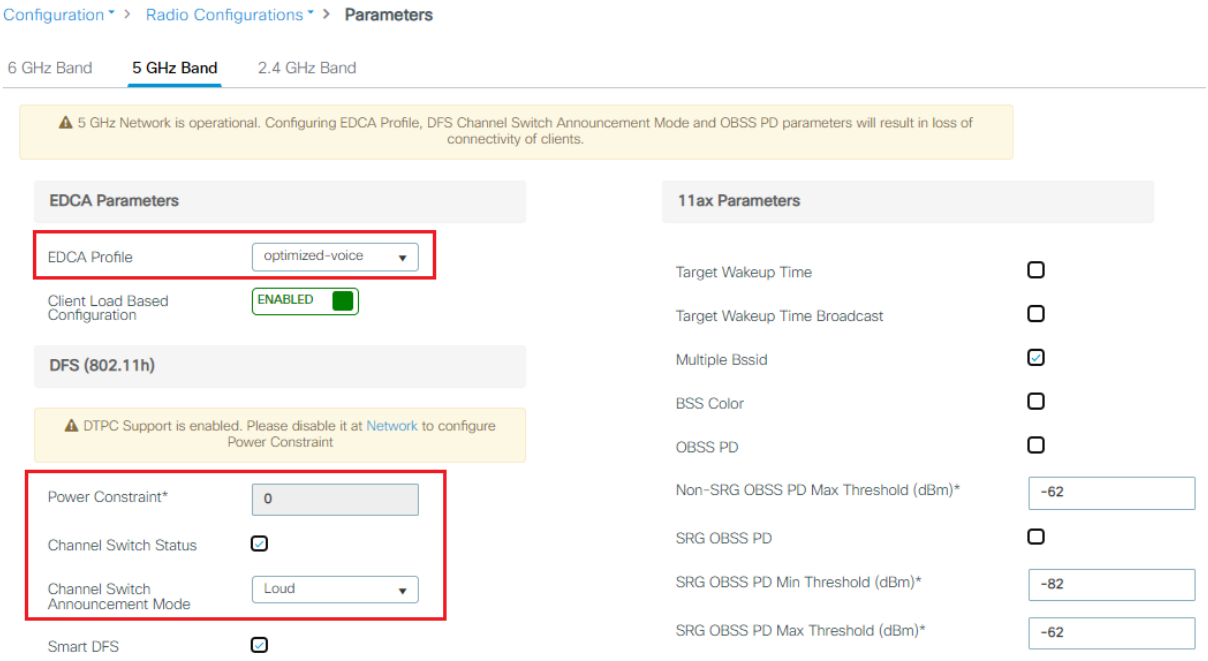
Data rates 5GHz.

The default data rate set will work just fine, however Ascom recommends disabling the lowest data rates and have 12Mbps as lowest data rate.

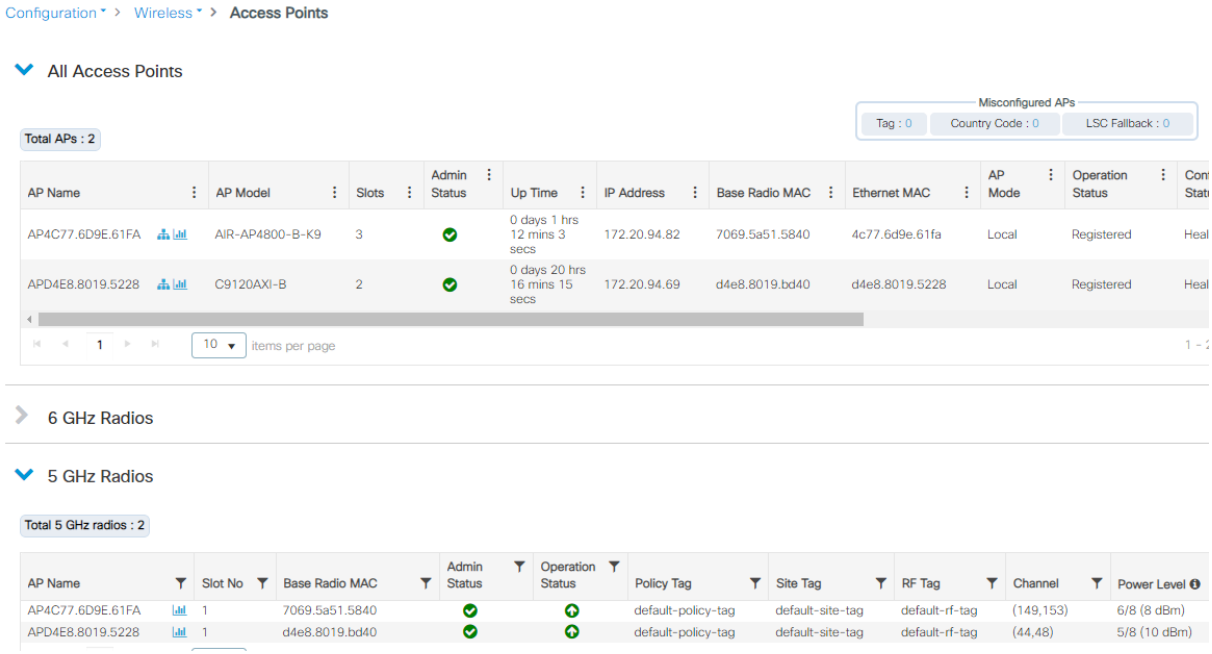


Data rates 2.4GHz.

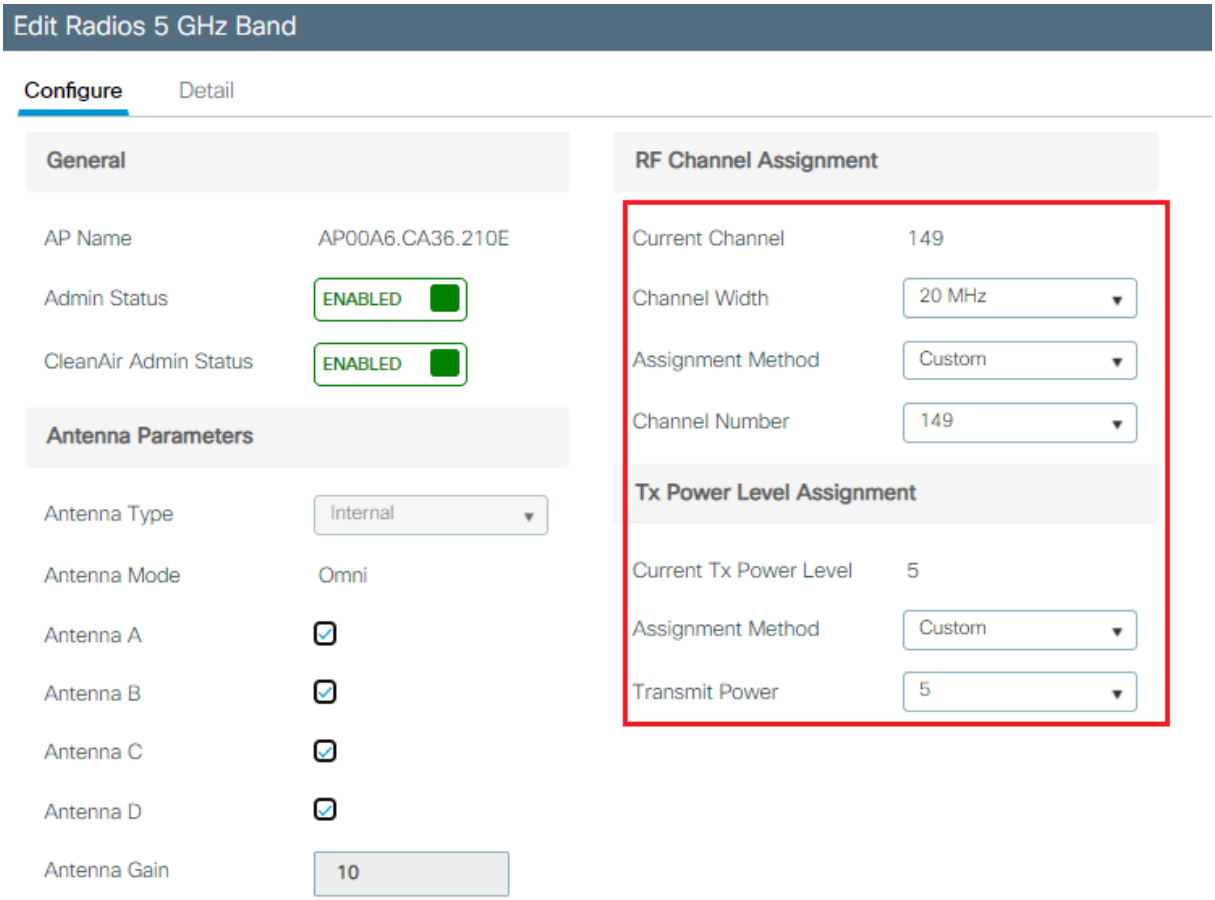
The default data rate set will work just fine, however Ascom recommends disabling the lowest data rates and having 12Mbps as lowest data rate.



- Set EDCA profile to optimized-voice. (Using EDCA Profile “WMM” is acceptable but “Voice Optimized” is to prefer when voice clients are present in the system)
- As Ascom do support Channel Switch Announcement it’s recommended to have this setting enabled in the system (loud). Only applicable when DFS channels are used.



Access points and channel overview. See the next picture for specific radio configuration.



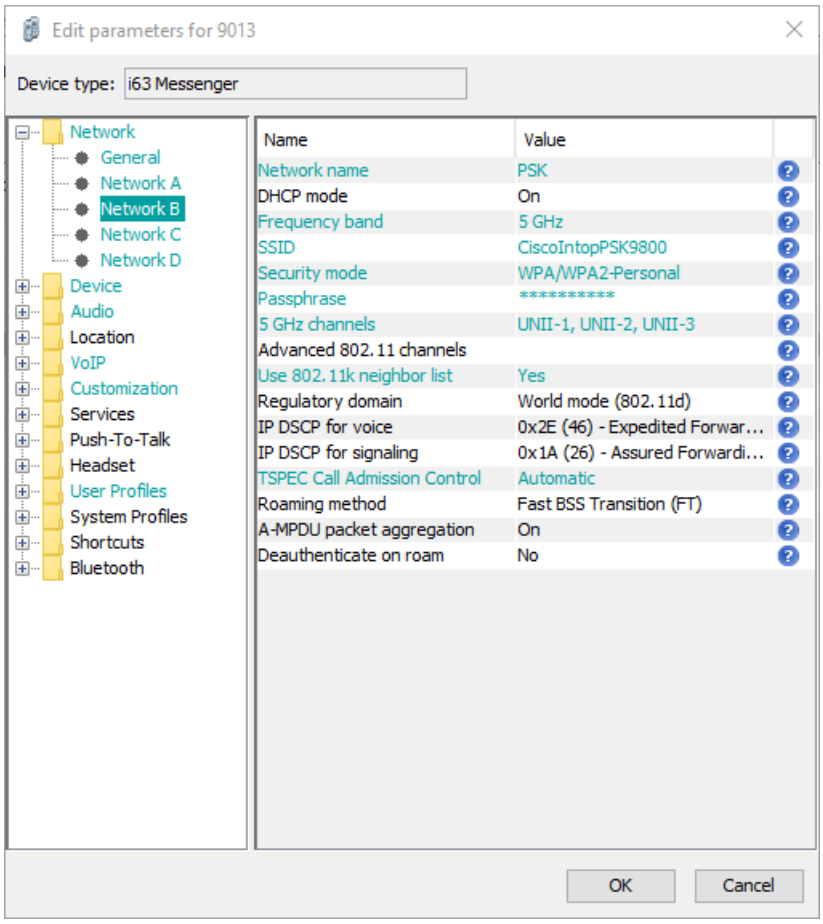
Ascom recommends only use channel 1, 6 and 11 for 802.11b/g/n. For 802.11a/n/ac use channels according to the infrastructure manufacturer, country regulations and per guidelines below.

Note that Tx power level and channel was manually set for test purpose. A typical setup will rely on the Global setting for channel and power configuration.

General guidelines when deploying Ascom i63 handsets in 802.11a/n/ac environments:

1. **For environments not utilizing 802.11k Neighbor Report - Enabling more than 8 channels will degrade roaming performance. In situations where UNII1 and UNII3 are used, a maximum of 9 enabled channels can be allowed. Ascom does not recommend exceeding these limits unless 802.11k is in use.**
2. **Ascom does support and can coexist in 80MHz channel bonding environments. The recommendation is, however, to avoid 80 MHz channel bonding as it severely reduces the number of available non-overlapping channels.**
3. **Make sure that all non-DFS channels 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 VoWi-Fi deployments.**

Ascom i63

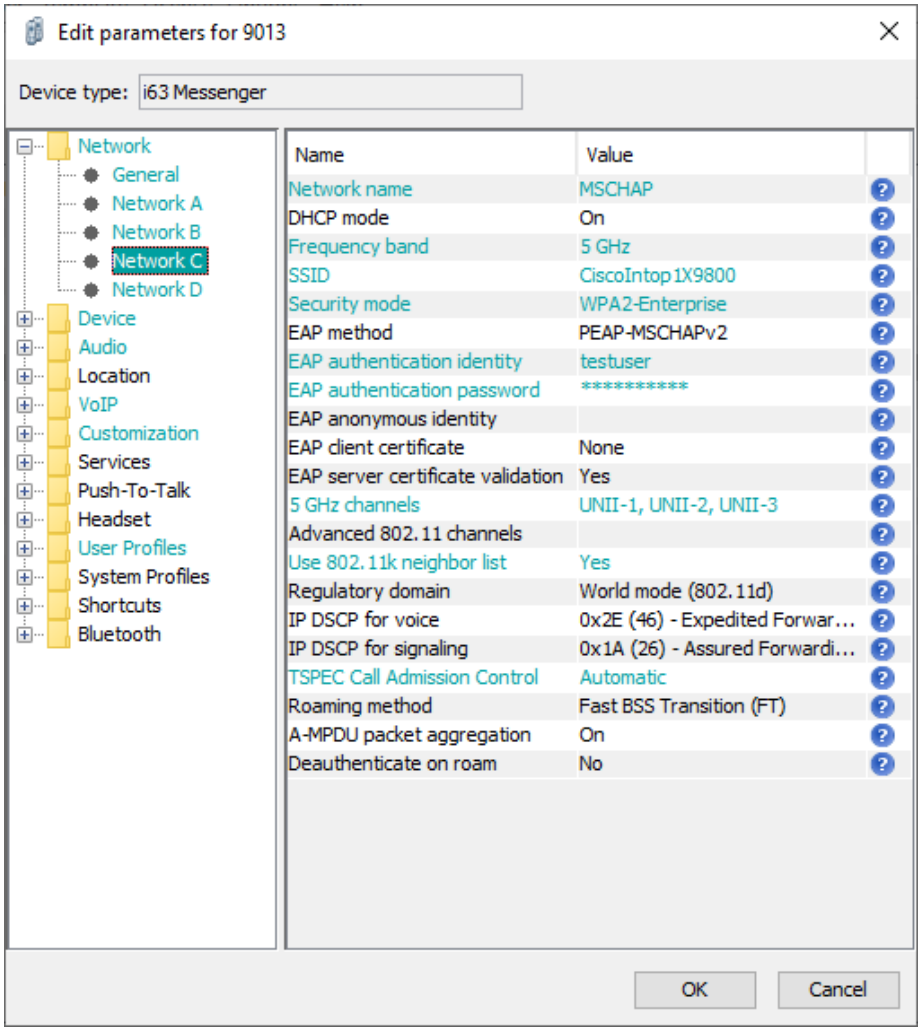


Network settings for WPA2-PSK

Make sure that the enabled channels in the i63 handset match the channel plan used in the system.

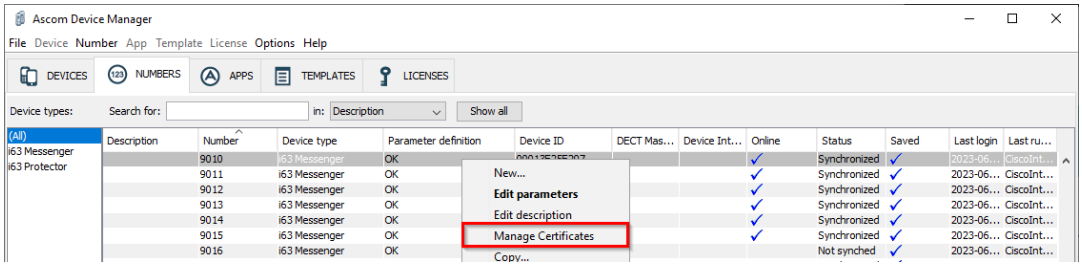
802.11k neighbor list will improve roaming performance especially when the number of channels in the system exceeds the 9 non-DFS channels.

Note. FCC is no longer allowing 802.11d to determine regulatory domain. Devices deployed in the USA must set Regulatory domain to “USA”.



Network settings for .1X authentication (PEAP-MSCHAPv2)

802.11k neighbor list will improve roaming performance especially when the number of channels in the system exceeds the 9 non-DFS channels.



802.1X Authentication requires a CA certificate to be uploaded to the phone by “right clicking” - > Edit certificates.

Note that both a CA and a client certificate are needed for TLS.

Appendix B: Interoperability Validation Records

Pass	21
Fail	0
Comments	5
Not verified	4
Total	30

Refer to the attached file for detailed verification results.

Document History

Rev	Date	Author	Description
D1	20-June-2023	NLRPa	Initial draft
P1	17-July-2023	NLRPa	Minor adjustments after peer review