

**TC52, TC57, TC72,
TC77, PS20, EC30,
MC93**

Voice Deployment



ZEBRA

Best Practices Guide

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Revision History

Changes to the original guide are listed below:

Change	Date	Description
V1.0	11/2018	First version dedicated to TC52, TC57, TC72, TC77, and PS20
MN-003430-01 Rev. A	12/2018	Initial release

Change	Date	Description
MN-003430-02 Rev. A	06/2019	Update: <ul style="list-style-type: none"> - Device Settings ChannelMask_2.4GHz and ChannelMask_5.0GHz. - Notes in Device Settings section. - Notes and Table 5 in Recommendations for Common Infrastructure Settings section. - Notes and Table 6 in Recommendations for CISCO Infrastructure Settings section. - Zebra Recommended WLC and AP Models by Vendor section. Add: <ul style="list-style-type: none"> - Documented support for device MC93 and EC30. - Documented support for Aruba and Extreme. - Device Wi-Fi QoS Tagging and Mapping section.
MN-003430-03EN Rev. A	07/2020	Added Additional Configurations for Voice Multicast Applications.

Table of Contents

Copyright	2
Terms of Use	2
Revision History	2
About This Guide	
Introduction	6
Chapter Descriptions	6
Notational Conventions	7
Related Documents	7
Service Information	7
Provide Documentation Feedback	7
Device Settings	
Introduction	8
Default, Supported, and Recommended Voice Device Settings	8
Network Settings and Device RF Characteristics	
Introduction	13
Recommended Environment	13
Device RF Capabilities	14
Infrastructure and Vendor Model Recommendations	
Introduction	15
Recommendations for Common Infrastructure Settings	15
Recommendations for Cisco Infrastructure Settings	17
Notes	18
Recommendations for Aruba Infrastructure Settings	20
Additional Configurations for Voice Multicast Applications	21
Zebra's PTT Express Deployment	21
Zebra Recommended WLC and AP Models by Vendor	22
Cisco	22
Extreme Networks	22
Aruba	22

List of Tables

Table 1. Default, Supported, and Recommended Voice Device Settings	9
Table 2. Device Wi-Fi QoS Tagging & Mapping for Outgoing Traffic	11
Table 3. Network Recommendations	13
Table 4. RF Capabilities	14
Table 5. Recommendations for Common Infrastructure Settings	16
Table 6. Zebra Recommendations for the Cisco Infrastructure	17
Table 7. Zebra Recommendations for the Extreme Networks Infrastructure	19
Table 8. Zebra Recommendations for the Aruba Infrastructure	20
Table 9. Zebra Recommendations of Additional Aruba Infrastructure Settings to Support PTT Express.	21

About This Guide

Introduction

This guide provides recommendations for voice deployment using the following mobile computers and their accessories.

- TC52
- TC57
- TC72
- TC77
- PS20
- MC93
- EC30.

Chapter Descriptions

Topics covered in this guide are as follows:

- [Device Settings](#) provides device settings: default, supported, and recommendations for voice traffic.
- [Network Settings and Device RF Characteristics](#) provides device settings for the recommended environment and device RF parameters.
- [Infrastructure and Vendor Model Recommendations](#) provides Zebra recommendations for common vendor infrastructures and specific recommendations by vendor.

For details about configurations and parameters, refer to vendor documentation.

Notational Conventions

The following conventions are used in this document:

- “Device” refers to all configurations of the Zebra TC52,TC57, TC72, TC77, PS20, MC93, and EC30.
- **Bold** text is used to highlight the following:
 - Dialog box, window and screen names
 - Drop-down list and list box names
 - Check box and radio button names
 - Icons on a screen
 - Key names on a keypad
 - Button names on a screen.
- Bullets (•) indicate:
 - Action items
 - Lists of alternatives
 - Lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

Related Documents

For the latest version of this guide and all documentation sets for the TC52,TC57, TC72, TC77, PS20, MC93, and EC30, go to: zebra.com/support. Refer to specific vendor documentation for detailed infrastructure information.

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- Model number or product name
- Software type and version number.

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Device Settings

Introduction

This chapter includes device settings for default, supported, and recommendations for voice traffic.

Default, Supported, and Recommended Voice Device Settings

[Table 1 on page 9](#) includes specific recommendations for voice which are not set as default out-of-the-box configurations. It is generically advised to examine those specific settings in alignment with the WLAN network needs and compatibilities. Making blind changes to the defaults in some cases could harm generic connectivity performance.

Besides the specific settings that need careful examination, most of the device default settings are already an optimized configuration for voice, optimized together with generic connectivity subjects. For that, it is recommended to keep the defaults as is, letting them dynamically adjust to the WLAN network dynamic feature-selection levels. These defaults should change only if there are WLAN network (WLC, AP) features that mandate respective changes on the device side to allow proper inter-operation.

Note the following:

- By default, PMKID is disabled on the device. If your infrastructure configuration is configured for PMKID, enable PMKID and disable the OKC configuration.
- The Subnet Roam feature allows you to change the network IP of the WLAN interface when the network is configured for a different subnet on the same ESSID.
- For the device's execution of the default FT (also known as Over-the-Air), in case that other Fast Roaming Methods might be available on the same SSID, see [Fast Roam Methods](#) in the [Table 5 on page 16](#) and relevant notes in [Recommendations for Common Infrastructure Settings on page 15](#).
- A change to the setting can be accomplished via MDM Agents. A subset of the parameters can be also changed via UI.
- Android Battery Optimization feature
 - For voice applications, and for any highly-dependent client-server communication apps, it is recommended not to be subjected to the Android Battery Optimization feature (also known as Doze Mode) in device management tools.
 - When an app is subjected to Battery Optimization, it may cause interruptions in communication between dependent endpoints and servers.

Device Settings

Table 1 Default, Supported, and Recommended Voice Device Settings

Feature	Default Configuration	Supported Configuration	Recommended for Voice
Auto Time Config	Disabled	<ul style="list-style-type: none"> • Enable (works only on Extreme infrastructure) • Disable 	As default
State11d	Country selection set to Auto	<ul style="list-style-type: none"> • Country selection set to Auto • Country selection set to Manual 	As default
ChannelMask_2.4GHz	All channels enabled subjected to regulatory	Any individual channel can be enabled or disabled, subjected to regulatory.	<p>Device Mask shall match the exact set of network side operating channels configuration.</p> <p>It is further recommended to configure both the device and the network to a reduced set of channels 1, 6, 11, if WLAN SSID is enabled on 2.4G.</p>
ChannelMask_5.0GHz	<p>Up to Android Oreo Build Number 01.13.20:</p> <ul style="list-style-type: none"> • All non DFS channels enabled. <p>From Android Oreo Build Number 01.18.02 onwards, and All Android Pie:</p> <ul style="list-style-type: none"> • All channels enabled, including DFS. <p>All the above subjected to regulatory.</p>	Any individual channel can be enabled or disabled, subjected to regulatory.	<p>Device Mask shall match the exact set of network side operating channels configuration.</p> <p>It is further recommended to configure both the device and the network to a reduced set of only non-DFS channels.</p> <p>For example, in North America, it is recommended to configure channels to:</p> <p>36, 40, 44, 48, 149, 153, 157, 161, 165.</p>
Band Selection	Auto (Both 2.4 GHz and 5 GHz bands enabled)	<ul style="list-style-type: none"> • Auto (Both bands enabled) • 2.4 GHz • 5 GHz 	5 GHz

Device Settings

Table 1 Default, Supported, and Recommended Voice Device Settings (Continued)

Feature	Default Configuration	Supported Configuration	Recommended for Voice
Band Preference	Disabled	<ul style="list-style-type: none"> • Enable for 5 GHz • Enable for 2.4 GHz • Disable 	Enable for 5 GHz, if WLAN SSID is on both bands
Open Network Notification	Disabled	<ul style="list-style-type: none"> • Enable • Disable 	As default
Advanced Logging	Disabled	<ul style="list-style-type: none"> • Enable • Disable 	As default
User Type	Non-Restricted	<ul style="list-style-type: none"> • Enable • Disable 	As default
CCKM	Enabled	<ul style="list-style-type: none"> • Enable • Disable 	As default
FT	Enabled	<ul style="list-style-type: none"> • Enable • Disable 	As default
OKC	Enabled	<ul style="list-style-type: none"> • Enable • Disable 	As default
PMKID	Disabled	<ul style="list-style-type: none"> • Enable • Disable 	As default
Power Save	NDP (Null data power save)	<ul style="list-style-type: none"> • NDP • PS-POLL • WMM-PS 	As default
11k	Enabled	<ul style="list-style-type: none"> • Enable • Disable 	As default
Subnet Roam	Disabled	<ul style="list-style-type: none"> • Enable • Disable 	As default
11w	Disabled	<ul style="list-style-type: none"> • Enable and 11W set to Required • Enable and 11W set to Optional • Disable 	As default
Channel Width	2.4 Ghz - 20 MHz 5 Ghz - 20 MHz, 40 MHz and 80 MHz	Not configurable	As default

Table 1 Default, Supported, and Recommended Voice Device Settings (Continued)

Feature	Default Configuration	Supported Configuration	Recommended for Voice
11n	Enabled	<ul style="list-style-type: none"> • Enable • Disable <p>Note: If disabled, 11ac is also forced to disabled</p>	As default
11ac	Enabled	<ul style="list-style-type: none"> • Enable • Disable 	As default

Device Wi-Fi QoS Tagging and Mapping

[Table 2](#) describes the device QoS tagging and mapping of packets from the device to the AP (i.e. outgoing packets in the uplink direction).

The tagging and mapping of traffic in the downlink direction from the AP to the device is determined by the AP or controller vendor implementation or configuration, which is not in the scope of this document.

For the uplink direction, an application on the device normally sets Differentiated Service Code Point (DSCP) or Type of Service (ToS) values for its sourced packets, as determined by its own specifications. Prior to the transmission of each packet over Wi-Fi, the DSCP/ToS values determine the device's further 802.11 Tagging ID assigned to the packet, and the mapping of the packet to 802.11 Access Category.

The 802.11 tagging and mapping columns are provided here for visibility only. They are not configurable. The IP DSCP or ToS values may or may not be configurable, depending on the app.



NOTE: [Table 2](#) describes the tagging/mapping values for outgoing packets when no other dynamic protocols affect them by standard specifications. For example, if the WLAN infrastructure mandates Call Admission Control (CAC) protocol for certain traffic types (such as Voice and/or Signaling) then the tagging and mapping automatically obey the dynamic states of the CAC specifications. This means that there could be CAC configuration or sub-periods in which the tagging and mapping apply different values than mentioned in the table, even though the DSCP value is the same.

Table 2 Device Wi-Fi QoS Tagging & Mapping for Outgoing Traffic .

IP DSCP Class Name	IP DSCP Value	ToS Hexa	Tagging of 802.11 TID (Traffic ID), and UP (802.1d UserPriority)	Mapping to 802.11 Access Category. (same as WiFi WMM AC spec)
none	0	0	0	AC_BE
cs1	8	20	1	AC_BK
af11	10	28	1	AC_BK
af12	12	30	1	AC_BK
af13	14	38	1	AC_BK
cs2	16	40	2	AC_BK
af21	18	48	2	AC_BK

Table 2 Device Wi-Fi QoS Tagging & Mapping for Outgoing Traffic (Continued).

IP DSCP Class Name	IP DSCP Value	ToS Hexa	Tagging of 802.11 TID (Traffic ID), and UP (802.1d UserPriority)	Mapping to 802.11 Access Category. (same as WiFi WMM AC spec)
af22	20	50	2	AC_BK
af23	22	58	2	AC_BK
cs3	24	60	4	AC_VI
af31	26	68	4	AC_VI
af32	28	70	3	AC_BE
af33	30	78	3	AC_BE
cs4	32	80	4	AC_VI
af41	34	88	5	AC_VI
af42	36	90	4	AC_VI
af43	38	98	4	AC_VI
cs5	40	A0	5	AC_VI
ef	46	B8	6	AC_VO
cs6	48	C0	6	AC_VO
cs7	56	E0	6	AC_VO

Network Settings and Device RF Characteristics

Introduction

This chapter includes device settings for the recommended environment and device RF characteristics.

Recommended Environment

- A Voice Grade Site Survey is required and should insure the requirements in [Table 3](#) are met.
- Signal to Noise Ratio (SNR), measured in dB, is the delta between the Noise in dBm and the Coverage RSSI in dBm. The minimum value for that delta is mentioned in [Table 3](#). Ideally, the raw Noise floor should be approximately -90 dBm or weaker.
- Same-Channel Separation: in floor level, wherever two or more APs with the same-channel are in RF-sight of a scanning device in given location. The value included in [Table 3](#) specifies the minimum RSSI delta between those same-channel APs.

Table 3 Network Recommendations

Setting	Value
Latency	< 100 ms end-to-end
Jitter	< 100 ms
Packet Loss	< 1%
Minimum AP Coverage	-65dBm
Minimum SNR	25dB
Minimum Same-Channel Separation	19dB
Radio Channel Utilization	< 50%

Table 3 Network Recommendations (Continued)

Setting	Value
Coverage Overlap	20% in critical environments
Channel Plan	2.4 GHz: 1, 6, 11 <ul style="list-style-type: none"> • No adjacent channels (overlapping) • Overlapping APs must be on different channels 5 GHz: 36, 40, 44, 48, 149, 153, 157, 161, 165 <ul style="list-style-type: none"> • If you are using DFS channels, broadcast the SSID in beacons Note: U-NII-2 (DFS channels, 52 to 140) and U-NII-3 (channels 149 to 165) are subjected to the Regulatory for the specific country.

Device RF Capabilities

The RF capabilities listed in [Table 4](#) are provided by the Zebra device. These are not configurable but are documented here for visibility.

Table 4 RF Capabilities

Setting	Value
DTPC	Supported (as per CCX v4)
Roam Threshold	-65dbm (cannot be modified)
Device-specific Antenna Configuration	<ul style="list-style-type: none"> • TC52: 2x2 MIMO • TC57: 2x2 MIMO • TC72: 2x2 MIMO • TC77: 2x2 MIMO • PS20: 2x2 MIMO • MC93: 2x2 MIMO • EC30: 2x2 MIMO
11n Capabilities	A-MPDU Tx/Rx, A-MSDU Rx, STBC, SGI 20/40 etc.
11ac Capabilities	Rx MCS 8-9 (256-QAM) and Rx A-MPDU of A-MSDU

Infrastructure and Vendor Model Recommendations

Introduction

This chapter includes Zebra recommendations for common vendor infrastructures and specific recommendations by vendor.

Recommendations for Common Infrastructure Settings

[Table 5 on page 16](#) lists the Zebra recommendations common to all vendors infrastructures.

- For best results, Wi-Fi Certified (Voice Enterprise certification from Wi-Fi Alliance) AP models should be used.
- If SSID for Voice is enabled on 2.4G band, it is recommended not to enable the 11b-legacy data rates on that band unless there is specific justification for it by some restricted coverage planning or there is a need to support old legacy devices.
- The device determines to roam to or connect to an AP depending on the infrastructure settings in effect and on many underlying dynamics of the RF ecosystem. Generically, the device scans for other available APs at certain trigger points (for example, in normal scenarios if the connected AP gets weaker than -65dBm). If it finds a better AP than it is already connected to, the device then moves to that AP.
- It is recommended to disable non-used Fast Roam Methods from the SSID. However, occasionally this is not possible due to older devices on the same SSID which support a different method. In this case, it is acceptable that two or more methods remain enabled if they can co-exist. The Zebra device automatically prioritizes its method selection.
- It is a general best practice to limit the amount of SSID per AP to only the required ones. There is no hard set recommendation on the number of SSIDs per AP as this would be a function of multiple RF environmental factors which are specific to each deployment. The major impact of a high number of SSIDs is on Channel Utilization which comprises not only users/apps traffic, but also beacons traffic of all the SSIDs on the channel (even from SSIDs which are not-in-use).
- Call Admission Control (CAC):
 - Network's CAC feature is designed to be helpful for VoIP deployments. However, by nature, it has algorithmic complexities when it comes to deciding if to accept or reject new calls based on the resources of the network in runtime.
 - It is not recommended to blindly enable (set to mandatory) CAC on the controller, without testing and proofing the stability of admissions (of calls) in the environment under stress and plurality conditions.
 - Also, it is recommended to be mindful in cases of different devices' CAC support-level (supporting CAC or not) which are using the same SSID. Zebra devices support CAC, but if other non-supporting

Infrastructure and Vendor Model Recommendations

devices use the same SSID, it is a factor that need to be tested for how or if the network CAC will impact the entire eco-system.

Table 5 Recommendations for Common Infrastructure Settings

Setting	Value
Infra type	Controller based
Security	WPA2
Voice WLAN	5 GHz only
Encryption	AES Note: Do not use WEP and TKIP.
Authentication: Server Based (Radius)	802.1X EAP-TLS/PEAP-MSCHAPv2
Authentication: Pre-Shared Key (PSK) Based	Enable both PSK and FT-PSK Note: Device automatically picks FT-PSK. PSK is necessary to support legacy/non-11r devices on same SSID.
Operational Data Rates	2.4 GHz: <ul style="list-style-type: none"> • G: 12, 18, 24, 36, 48, 54 (disable all lower rates, including 11b-legacy) • N: MCS 0-15 5 GHz: <ul style="list-style-type: none"> • A: 12, 18, 24, 36, 48, 54 (disable all lower rates) • AN: MCS 0 -15 • AC: MCS 0- 7, 8 Note: Rates settings may need to change per environmental characteristics to accomplish balanced AP Minimum Coverage as specified in Recommended Environment on page 13 .
Fast Roam Methods (See the Fast Roam Methods note above this table.)	If supported by infrastructure: <ul style="list-style-type: none"> • FT (802.11R) • CCKM • OKC or PMK Cache - Do not enable both Note: Device priority order from the top.
DTIM Interval	1
Beacon Interval	100
Channel Width	2.4 GHz: 20 MHz 5 GHz: 20 MHz
WMM	Enable
802.11k	Enable
802.11w	Disable

Table 5 Recommendations for Common Infrastructure Settings (Continued)

Setting	Value
802.11v	Disable
AMPSDU	Disable for Voice
CCX Radio Measurement	Disable

Recommendations for Cisco Infrastructure Settings

Table 6 lists the Zebra recommendations specific to the Cisco infrastructure.

Table 6 Zebra Recommendations for the Cisco Infrastructure

Recommendation	Required	Recommended But Not Required
Configure voice WLAN to use the 802.11a band.		√
EAP Retry Timeout set to default.	√	
DHCP address assignment required option to be unchecked	√	
Disable Session Timeout or set to shift duration + one hour.	√	
Disable Client Exclusions.	√	
Set the User Idle Timeout to Session Timeout definition (above).	√	
Enable Fast SSID change.	√	
Disable Flex Connect mode in Cisco AP.	√	
WMM should be allowed for the voice WLAN.	√	
Voice WLAN should be marked with Platinum QoS.	√	
Platinum QoS profile should have the 802.1p bits set to 6.	√	
Trust DSCP markings end to end.		√
Verify that the EDCA profile on the controller is set to Voice Optimized.		√
Verify that Aggressive Load Balancing is disabled.	√	
Verify that DTPC is disabled. See Recommendations for DTPC (Dynamic Transmit Power Control) on page 19.		√
Verify the Beacon interval is set to 100 ms.	√	
Verify that Client MFP is set to Disabled.		√
Verify that peer-to-peer blocking is disabled.	√	
Validate the virtual interface address is the same across all controllers in the same mobility group.	√	

Table 6 Zebra Recommendations for the Cisco Infrastructure (Continued)

Recommendation	Required	Recommended But Not Required
Validate that the mobility status shows as UP between all controllers in the same mobility group.	√	
EAP-Identity-Request Timeout (seconds) set to 1.	√	
EAP-Identity-Request Max Retries set to 20.	√	
EAP-Request Timeout (seconds) set to 20.	√	
EAP-Request Max Retries set to 2.	√	
Disable MAC protocol data unit (MPDU) aggregation for Voice.	√	
Disable Optimized Roaming	√	
Ensure FT (11r) is set to 'Enable', not 'Adaptive'	√	

Notes

- Cisco software versions must be inspected to see if they are marked DF (deferred release) by Cisco. Avoid these version if they are deferred.
- In Cisco ecosystems it is a typical IT practice to enable features which attempt to learn and improve the RF environment dynamically. While the end goal is positive, the ongoing processing of learning and changing can unpredictably impact the solidity of the RF, which Voice requires. These features include: RRM (Radio Resource Management), DCA (Dynamic Channel Assignment), Auto Transmit Power, CHD (Coverage Hole Detection), Off-Channel-Scan-Defer, and other inter-related features.
 - Zebra strongly recommends taking the extra time and steps to perform due-diligence tuning the features mentioned above throughout the deployment, during the enabling phases, and after every re-configuration. Using Wireless Survey and RF tools and later frequent monitoring of the health and impact of these specific features is also recommended. If examinations and inspections are not possible, Zebra recommends disabling them completely in Voice deployments.
- Recommendations made below are further best-practices for RRM, DCA, CHD, and related features. These could be subjective and should be considered a starting point. The recommendation mentioned above should be performed regardless.
 - Recommendations for DCA - when set to Automatic:
 - The DCA Channel List is the de facto set of channels from which each radio/band of the APs is assigned a channel.
 - Sensitivity Threshold is set to Low.
 - Interval of DCA is set to 24 hours.
 - For several other DCA parameters of the Avoid ... terminology, follow Cisco guidelines.
 - Recommendations for RRM, CHD, and Auto Transmit Power:
 - Set the monitoring interval and frequency values to maximum (lowest frequency) where possible, respective to tasks, such as APs channel scans, and neighbor-packets-scans.
 - Keep the Transmit Power minimum and maximum within boundary of no more than 6 dB. For example, min = 12, max = 18. **Note:** This is a CLI only param.

- Recommendations for Off Channel Scan Defer:
 - For Scan Defer Priority selection for Voice (platinum, UP = 6), set the Scan Defer Time to the maximum value supported (lowest frequency of the scan).
- Dedicate extra time to tuning the mandatory and supported rates:
 - Beacons set to the lowest-mandatory rate (Cisco default).
 - Lower rates below lowest-mandatory should be set to disabled, not set to supported, unless there is specific reason to make the cell sizes appear smaller than the range (distance) that data/voice packets can travel. That is typically not the case.
- Recommendations for Aironet IEs:
 - In typical cases of Voice deployments, enabling Aironet IEs in settings of the controller would be required when CCKM is a selected method for fast roaming. Otherwise, other sub-features of the Aironet IEs are largely ineffective for Voice enterprise and were replaced in recent years by other standards.
 - If CCKM is not used as fast roam method, it is recommended to disable Aironet IE.
- Recommendations for DTPC (Dynamic Transmit Power Control)
 - DTPC is a mechanism in which the AP requests CCX-enabled clients to set their transmit power to a specific value. The power value itself is an outcome of dynamic algorithms of the RRM. In a deployed Voice solution with careful configuration of RRM parameters (i.e. good fit to the environment), it is assumed that the DTPC might help resolving corner cases of localized imbalance issues (for example, the AP not hearing the device), and otherwise be no harm.
 - When there is concern that the RRM deals with a complex RF environment, DTPC changes might happen more excessively in system-wide, reflecting the AP side RRM changes. A consequence of that could be: since the user/device moves faster than the speed of the RRM relearns/rebalances itself in surrounding areas, the moving device might stick with the prior DTPC value of the prior RF area, which is not desirable anymore in the new RF area, and the new DTPC value from the network is not yet correcting it. In essence, the DTPC can potentially 'manufacture' the same imbalance type that it is designed to solve. Then, AP's RRM indexes from the new RF area would cross their thresholds and loopback to make yet more power changes to resolve the manufactured-DTPC issues. This recursive loop could go on for quite some time and be interruptive to the Voice.
 - Therefore, it is recommended to disable the DTPC such that it will at least avoid the potential manufactured loop explained above.

Recommendations for Extreme Networks Infrastructure Settings

Table 7 lists the Zebra recommendations specific to the Extreme Networks infrastructure.

Table 7 Zebra Recommendations for the Extreme Networks Infrastructure

Recommendation	Required	Recommended But Not Required
Configure voice WLAN to use the 802.11a band.		√
If using EAP authentication, ensure that fast roaming is supported (for example, FT).		√
Use default WLAN QoS Policy settings.	√	
Bridging mode set to Local.	√	

Table 7 Zebra Recommendations for the Extreme Networks Infrastructure (Continued)

Recommendation	Required	Recommended But Not Required
Uncheck Answer Broadcast Probes.	√	
Use default Radio QoS Policy settings.	√	
Wireless Client Power set to Max.	√	

Recommendations for Aruba Infrastructure Settings

Table 8 lists the Zebra recommendations specific to the Aruba infrastructure.

Table 8 Zebra Recommendations for the Aruba Infrastructure

Recommendation	Required	Recommended But Not Required
Create a dedicated user role on Aruba for Voice devices, according to app deployment needs. Create a session ACL and place the voice protocols in prioritized high queue.	√	
Broadcast Filtering set to All or ARP.	√	
Make sure Dot1x Termination is disabled.	√	
Make sure Disable Probe Retry is set to its default (enabled).		√
Make sure Max Tx Failure is set to its default, disable (max-tx-fail=0).	√	
Disable Legacy only (5 Ghz/2.4 Ghz).	√	
Enable 802.11d/h.	√	
Enable Mcast-rate-opt (needed for multicast to go at highest rate).		√
Beacon-rate set with a rate that is also basic-rate.		√
Make sure Set Local Probe Request Threshold is set to its default, 0 (disable).	√	
Disable Client Match.	√	
Disable Band Steering.	√	
Make sure Voice Aware Scan is enabled and voice traffic of the given ACL definition (of the deployed app) is detected on the controller.	√	
Disable 80 MHz support.	√	

Additional Configurations for Voice Multicast Applications

Zebra's PTT Express Deployment

Table 9 lists the recommended configurations to support the PTT Express deployment.



NOTE: The settings in Table 9 are recommended by Zebra but they are not default in the Aruba controller releases. Validate these settings if they provide quality improvement in the production environment before configuring.

Table 9 Zebra Recommendations of Additional Aruba Infrastructure Settings to Support PTT Express.

Recommendation	Recommended
dynamic-multicast-optimization (Converts Multicast to Unicast. Higher data rate)	√
dmo-channel-utilization-threshold 90 (Falls back to Multicast traffic from Unicast if the channel utilization reaches 90%)	√
wmm-background-share 60 (Limits Background bandwidth usage to 60%)	√

Zebra Recommended WLC and AP Models by Vendor



NOTE: Model versioning recommendations mentioned in this section are based on satisfactory interop test-plan results. Zebra recommends that when other Software version (not mentioned here) is used by the customer, there is need to double check in Release Notes of the WLC/AP that the particular version is 'stable', by terminology of the vendor.

Cisco

- WLC 2500 / 2504
 - Software Versions: 8.3.111.0 and older releases.
- WLC 55xx series and 3504
 - Software Versions: 8.5.140.0 and older releases of 8.x.
 - Software Versions: 8.9.100.0.
- AP Models - 1242,1262, 1852, 2600, 2802, 3602, 3708 and 3800.

Extreme Networks

- RFS 6K
 - Software Versions: 5.8.1.0-016R and older releases.
- RFS 7K
 - Software Versions: 5.8.0.0-046R and older releases.
- NX9500
 - Software version 5.8.3.0-041R and older releases.
- AP Models – 650, 6532,7522,7532 and 8131

Aruba

- Aruba 72xx series
 - Software Version: 8.2.2.0 or later
- Aruba 70xx series
 - Software Version: 8.2.2.0
 - Software Version: 8.3.0.3.
- AP Models: 303H, 303 series, 300 series, 310 series, 320 series, 330 series, 340 series.
- IAP 300 series, 310 series, s20 series, 330 series, 340 series.
 - Software Version: 6.5.4.8

