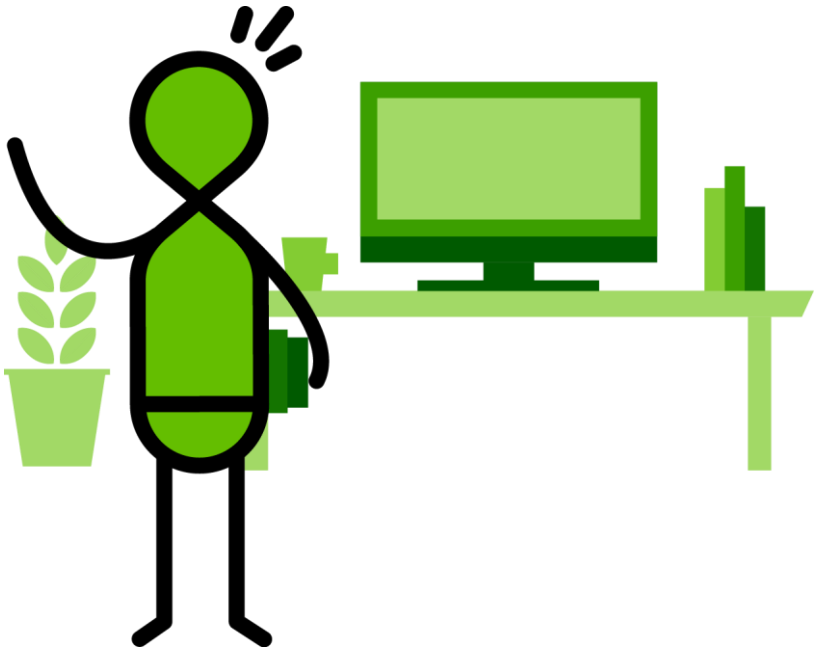
ZYXEL

Application Note

Wireless VoIP Best Practice (VoWiFi)

2019 June



Supported Platforms:

Zyxel WLAN controller and managed AP

Nebula cloud managed AP

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This application note is a guide to optimize the quality of Voice over IP (VoIP) on Zyxel wireless access points. Telephones have been replaced with IP-based phones using Voice over IP in many offices. Compared to desktop VoIP phones that require Ethernet, voice over WiFi is more convenient as it operates over WiFi on mobile devices. This guide provides several recommendations to optimize the quality of VoIP and mitigate latency when mobile devices roam between APs.

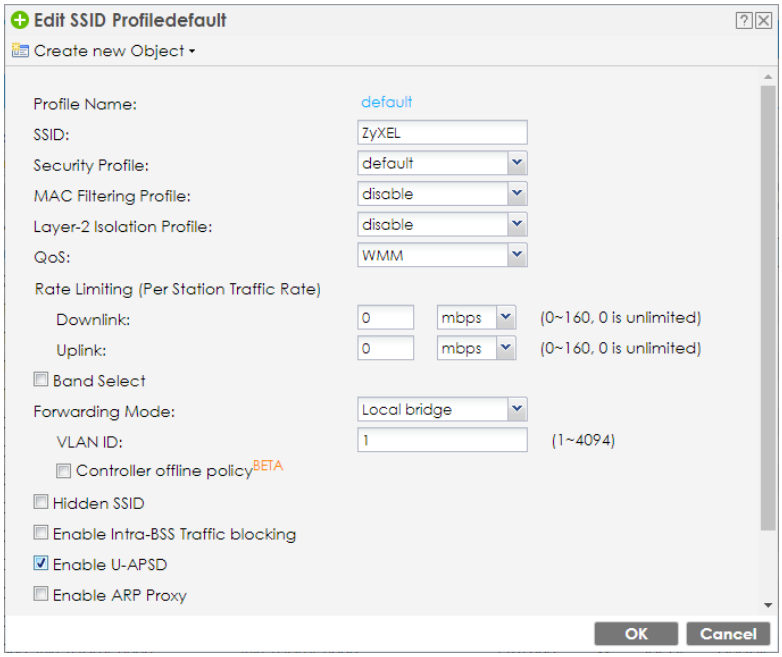
1. Network design and Firmware version
    a. Create a Voice VLAN and map the VLAN to a dedicated SSID. If you cannot dedicate the SSID to voice, at least create a dedicated VLAN for wireless.
    b. For on-premises controller (NXC, USG, VPN, ATP), use local bridge mode, as tunnel mode will increase latency.
    c. Do not turn on L2-isolation or Intra-BSS traffic blocking.
    d. Firmware version:
        1. For NXC, please use v5.40 or version above
        2. For USG and ATP, please use v4.33 or version above
        3. For VPN, please use v10.02 or version above
        4. For Nebula, please keep the firmware up-to-date.

2. Compatibility to WiFi phones
    a. Use a dedicated WiFi phone instead of a smart phone with VoIP APP because WiFi phones are designed with better voice roaming capability and voice quality.
    b. When using WiFi phones, enable U-APSD. U-APSD is an advanced power saving feature that many WiFi phones use by default to extend the maximum battery time. Keep in mind, some devices especially legacy devices, will have compatibility or performance issues with U-APSD enabled.

c. How to configure U-APSD

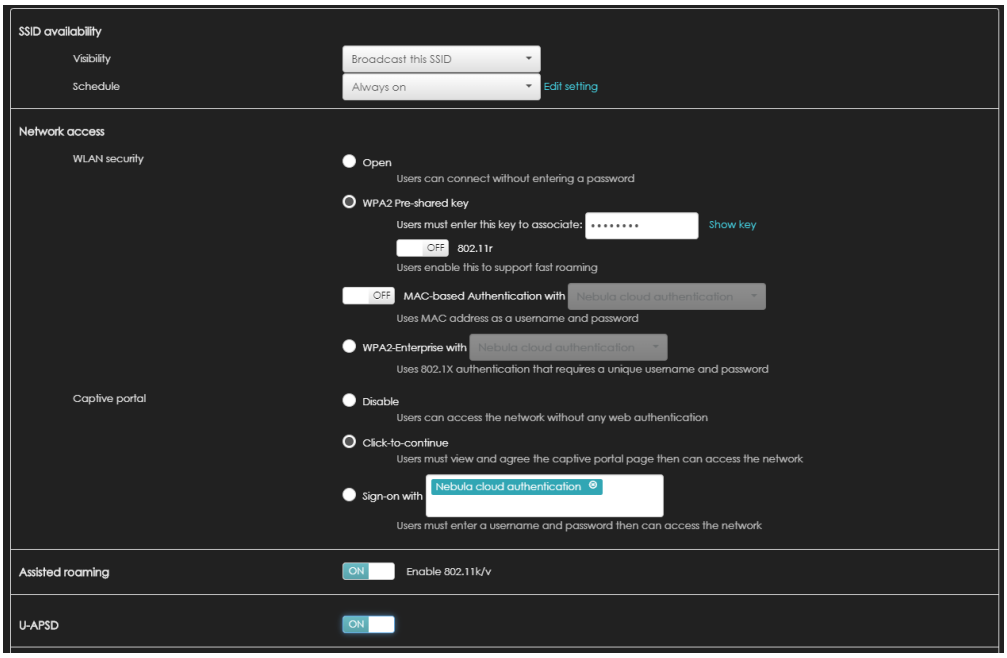
On-premise controller

Go to the SSID profile setting of the desired SSID to enable U-APSD.



Nebula

To enable this feature, go configuration of “authentication” of the desired SSID. Enable the U-APSD.

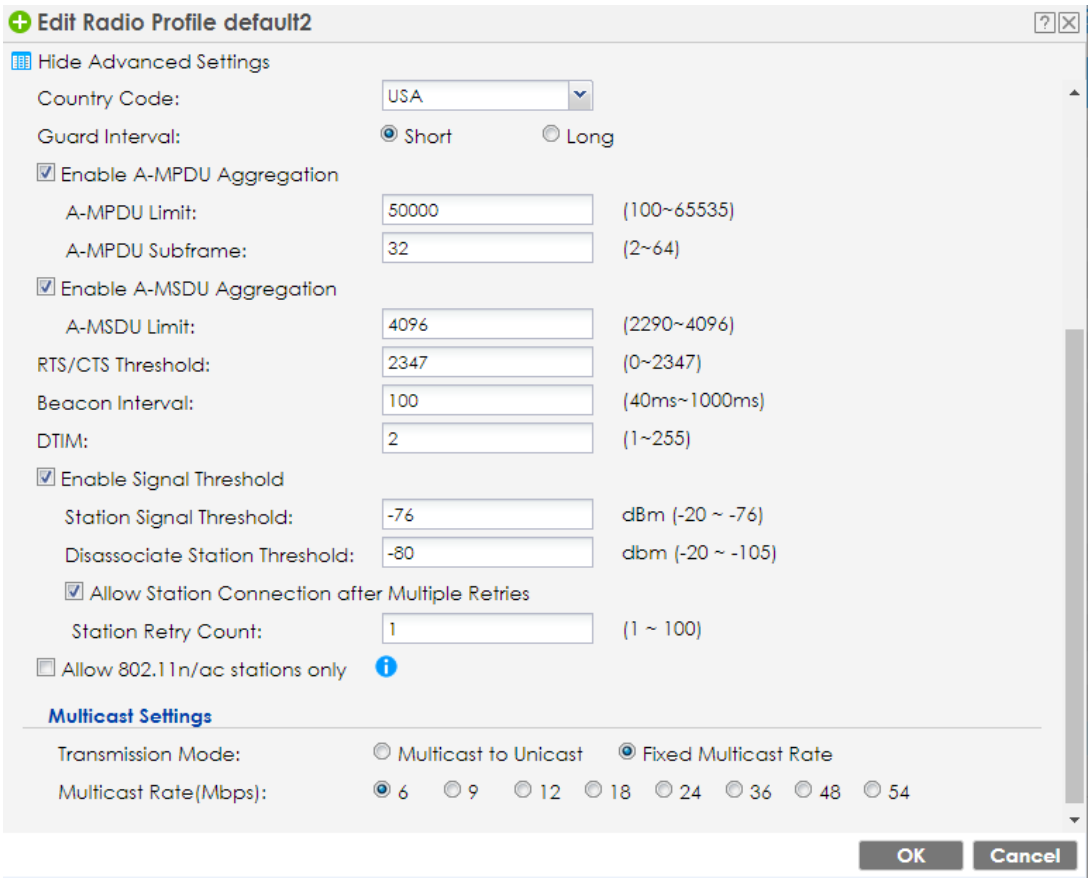


3. Improve voice quality with RF planning
    a. Use dedicated SSID for VoWiFi and 5 GHz for Voice SSID to improve voice quality.
    b. For RF channel selection, scheduled DCS to run in off-hours – Voice calls are very sensitive to latency and jitter. When an AP performs channel scanning, it will cause latency and jitter.
    c. For all locations with VoWiFi clients, its recommended to play your AP deployments to provide higher than -67 dBm signal coverage for 5 GHz. This usually means in one location, there will be at least one good signal AP (>-67 dBm) and other 2~3 AP in fair signal (-72~-78dBm).
    d. Use 20 MHz channel width for the voice SSID. The maximum 5 GHz power should be <18 dBm to avoid mismatch capability with client output power.
    e. In the case that 2.4 GHz must be enabled for the voice SSID, always set 2.4 GHz power 6~8 dBm lower than 5 GHz. Don't use a different SSID for 2.4 GHz and 5 GHz for voice application. It will sometimes confuse the roaming behavior of the phone device.
    f. Don't use Band-steering. It could cause interoperability issues with the WiFi phone. In the worst-case scenario, the WiFi phone will only use 2.4 GHz and the AP will keep trying to steer it to 5 GHz. For data only, that is usually not an issue but could lead to Voice quality issue.
    g. No more than 3 SSIDs should be enabled on any single AP.

h. For the Disassociate Station Threshold, do not use an aggressive threshold. We suggest using -80 or lower dBm to reduce the risk of premature call drops.

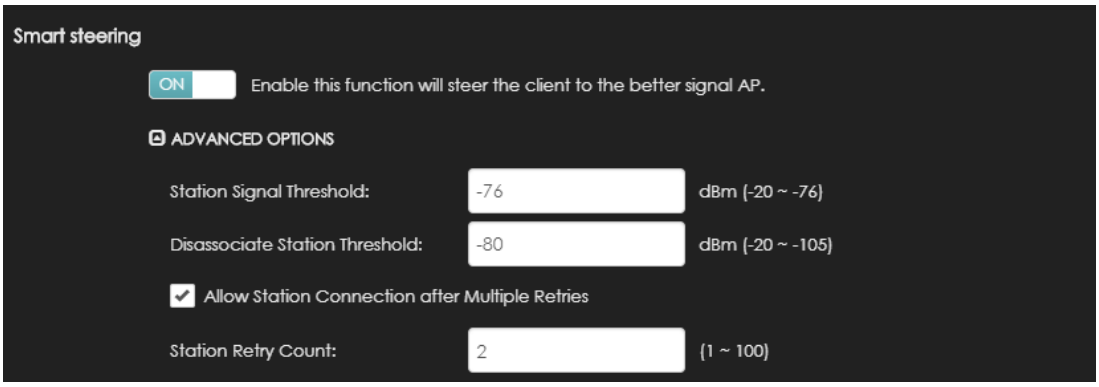
On-premise controller

Go to the Radio profile advanced setting of the desired SSID to enable.



Nebula

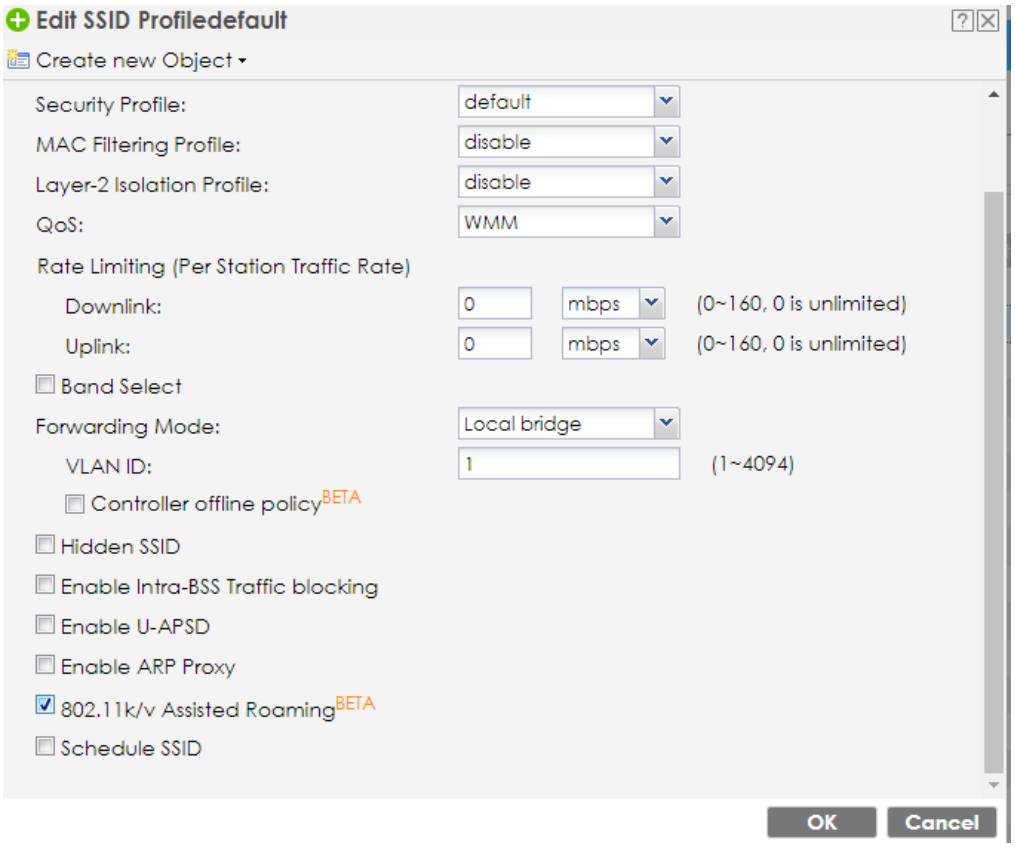
Go to smart steering, and change the value in advanced options



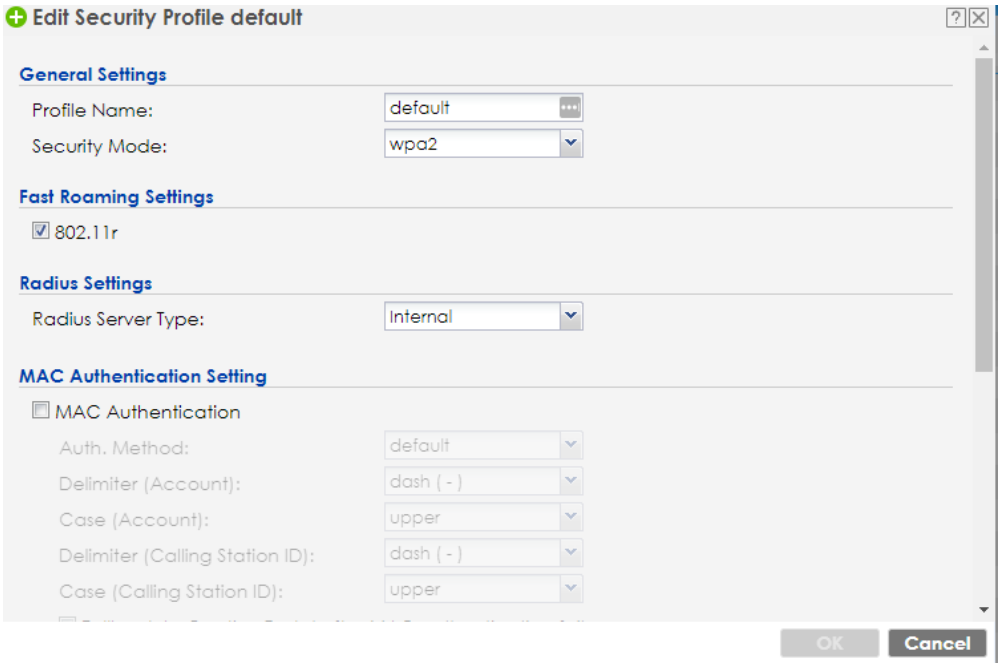
4. Roaming optimizations
    a. Enable 802.11k and 802.11v
    b. Enable 802.11r if WPA2-PSK or WPA2-Enterprise is used.

On-Premise controller

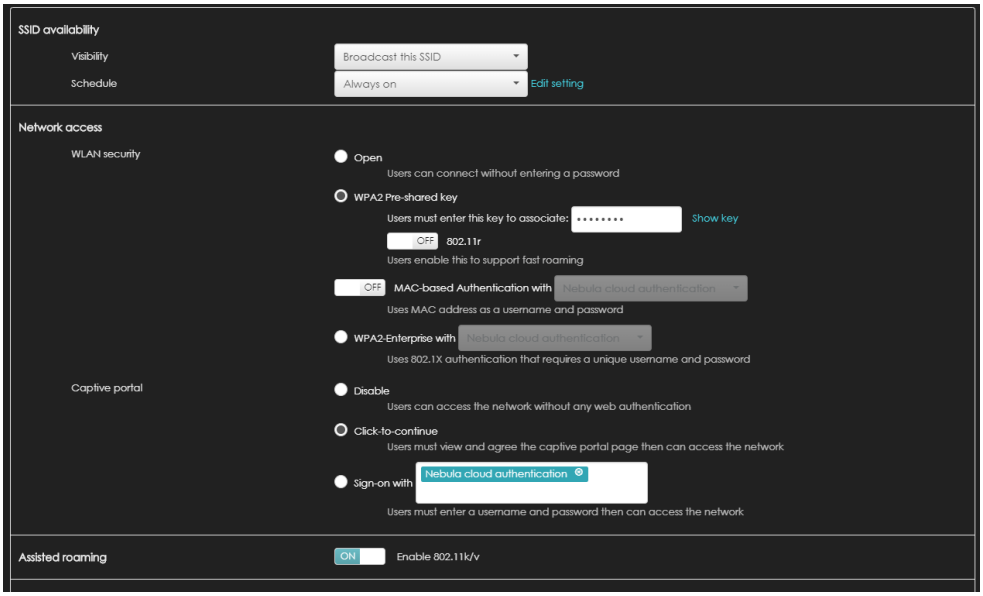
Go to the SSID Profile setting of the desired SSID to enable 802.11k/v Assisted Roaming.



Go to the Security profile setting of the desired SSID to enable 802.11r.



Nebula: Go to the Authentication setting of the desired SSID to enable 802.11r, and 11k/v.



c. Use WPA2-PSK for faster roaming
d. The following list of authentication types is in order of fastest to slowest.
    1. Open (no encryption)
    2. Pre-shared key with WPA2 and Fast roaming
    3. WPA2-Enterprise with Fast roaming
    4. Pre-shared key with WPA2
    5. WPA2-Enterprise