MT7986 TPC User Guide

2021/10/4 William

Version History

Version	Date	Author (Optional)	Description
0.1	2021-9-23	William	Initial draft
1.0	2021-10-4	Micheal Su	Official release

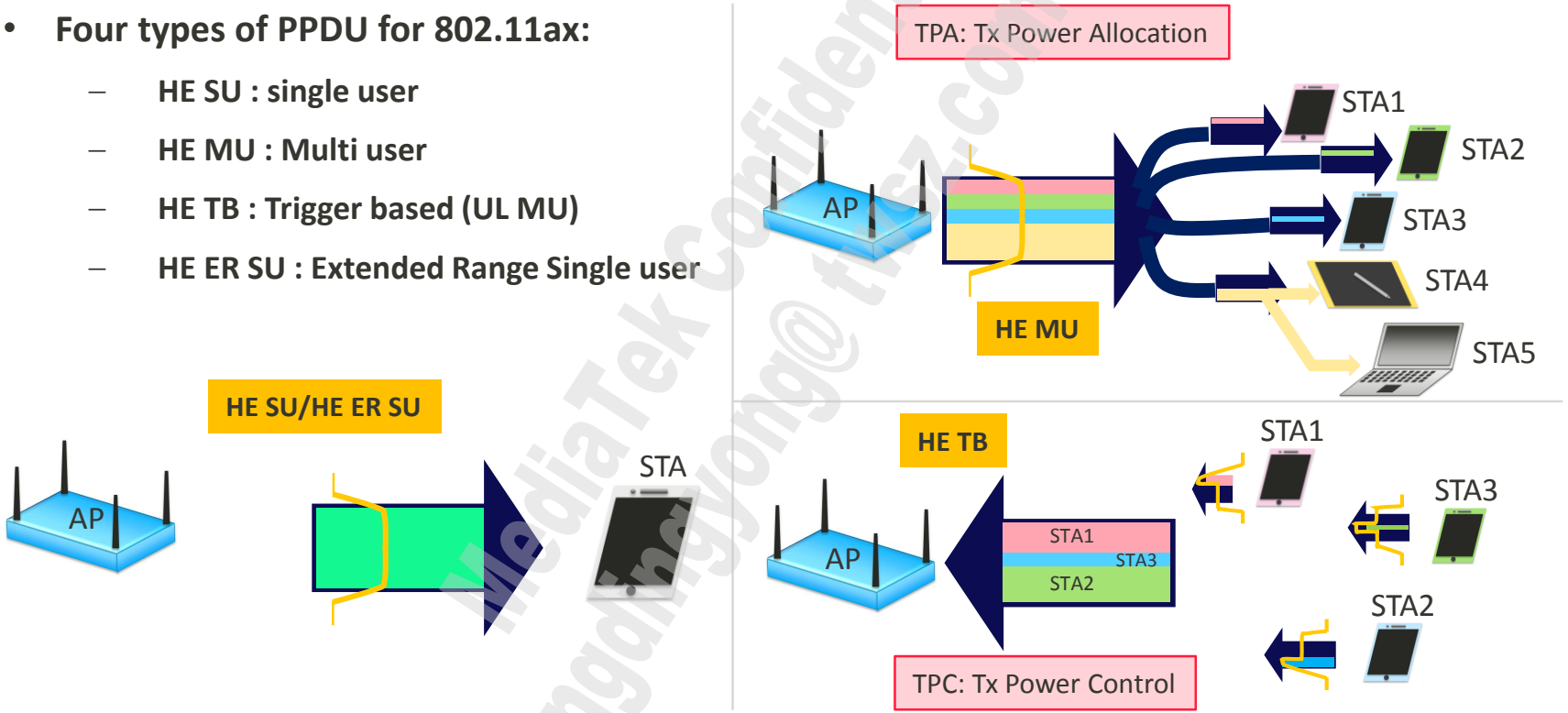
Outline

- TPC Feature Introduction
- How to Configure – profile
- How to Configure – runtime command

TPC Feature Introduction

HE PPDU Formats

- **Four types of PPDU for 802.11ax:**
  - **HE SU : single user**
  - **HE MU : Multi user**
  - **HE TB : Trigger based (UL MU)**
  - **HE ER SU : Extended Range Single user**

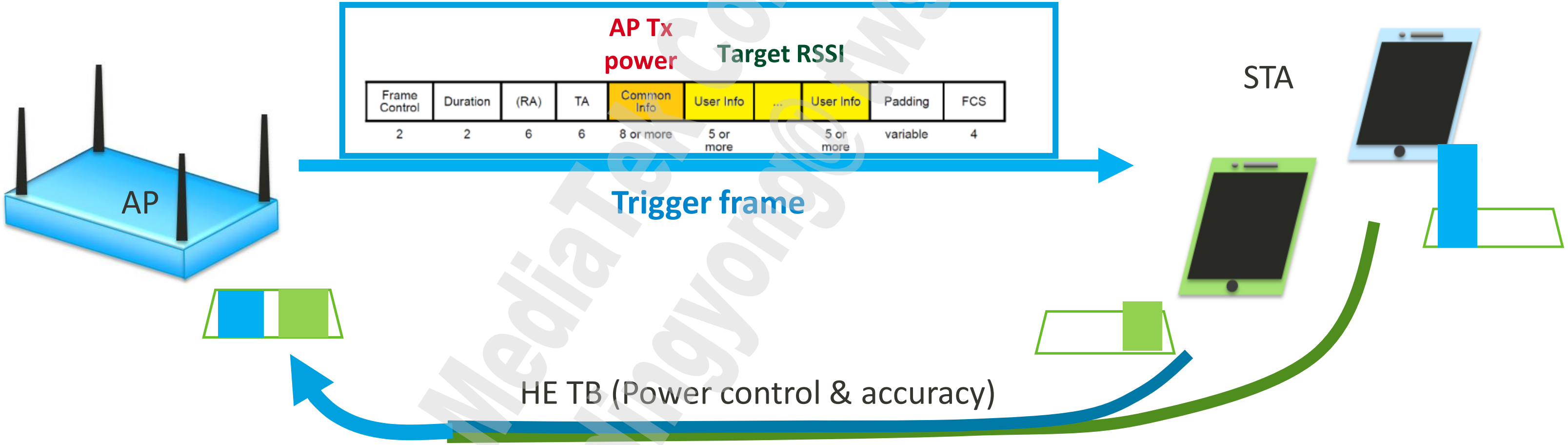


TPC (Tx Power Control)

- **Why TPC is needed ?**
  - **Widely different power levels between users at the AP will cause increased ICI (Inter Carrier Interference) & IRUI (Inter RU Interference)**
- **Power control for HE trigger-based PPDU (UL)**
- **HE trigger frame include the information**
  - **AP Tx Power**
  - **User target RSSI at AP**
- **STA Tx power is calculated by** $Tx_{pwr}^{STA} = Tx_{pwr}^{AP} - DL_{RSSI} + Target_{RSSI}$

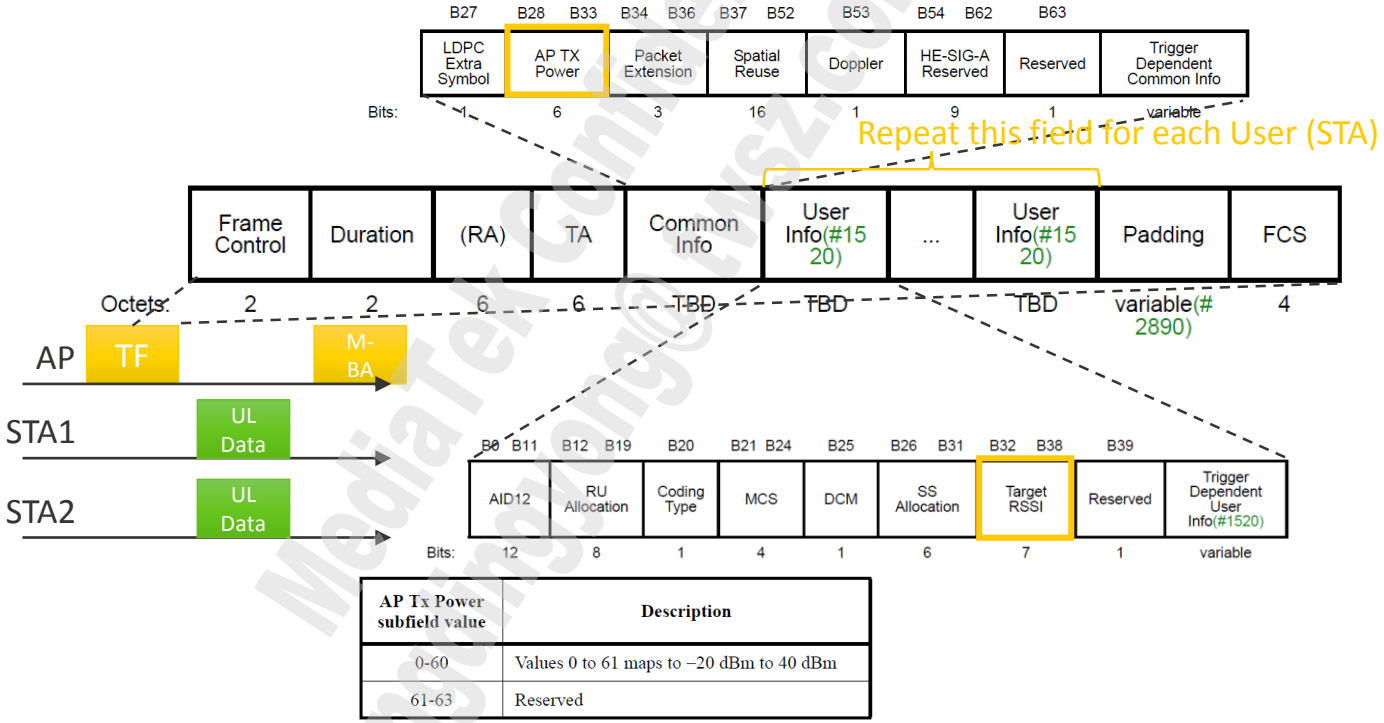
TPC (Tx Power Control)

- **In order to meet target RSSI, STA would adjust the Tx power according to AP <u>Tx power</u> & it <u>received RSSI</u>**



TPC in Trigger Frame

In Trigger Frame (TF) sent by AP



AP Tx Power subfield value	Description
0-60	Values 0 to 61 maps to –20 dBm to 40 dBm
61-63	Reserved

STA Power Headroom in HETB

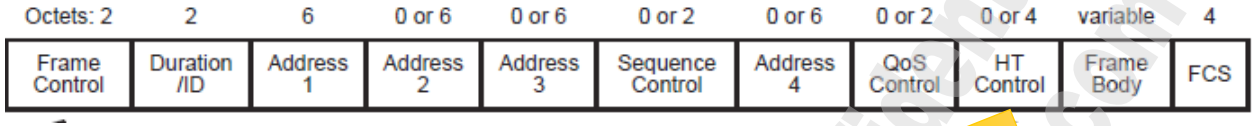


Table 9-9a—HT Control field

Variant	Bit 0 (value)	Bit 1 (value)	Bit 2-29	Bit 30	Bit 31
HE variant	VHT (1)	HE (1)	A-Control		

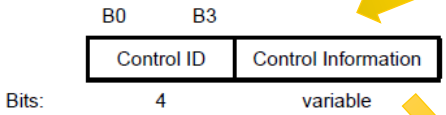
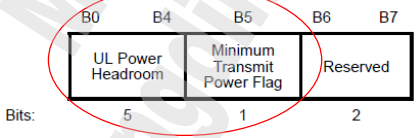


Figure 9-15b—Control subfield format

Table 9-18a—Control ID subfield values

Control ID value	Meaning	Length of the Control Information subfield (bits)	Content of the Control Information subfield
4	UL power headroom (UPH)	8	See 9.2.4.6a.5 (UPH Control)



HE TB Requirement

- **Power:**
  - **There are two STA classes that support HE trigger-based PPDUs**
    - Class A STA: high capability ,accuracy +/- 3dB
    - Class B STA: low capability ,accuracy +/- 9dB
  - **Range : A STA that transmits HE TB PPDU shall support minimum transmit power of max(P-32, -10).**
    - Ex. If maximum Tx power P=15dBm, STA shall support minimum transmit power -10dBm
    - Ex. If maximum Tx power P=23dBm, STA shall support minimum transmit power -9dBm

Parameter	Minimum Requirement		Comments
	Class A	Class B	
Absolute transmit power accuracy	±3 dB	±9 dB	Accuracy of achieving a specified transmit power.
RSSI measurement accuracy	±3 dB	±5 dB	The difference between the RSSI and the received power. Requirements are valid from minimum Rx to maximum Rx input power.
Relative transmit power accuracy	N/A(#3619)	±3 dB	Accuracy of achieving a change in transmit power for consecutive HE TB PPDU. The relative transmit power accuracy is applicable only to Class B devices.

*RSSI measurement accuracy applied range
2.4GHz : -20 ~ -82dBm
5GHz : -30 ~-82 dBm

Hot to Configure – profile

TPC Profile Setting

- **TPC is not support profile setting.**
- **TPC is default enabled.**
  Please use runtime command to disable/enable TPC.

Hot to Configure – runtime command

TPC Manual Mode

- **TPC On/Off:**
  - **iwpriv ra0 set TpcEnable=1/0**
    - TPC off : default target rssi @-40dBm
- **TPC Manual mode:**
  - **iwpriv ra0 set TpcManCtrl=1**
  - **iwpriv ra0 set TpcWlanIdCtrl=1:0:[#WlanID1]:0**
  - **iwpriv ra0 set TpcWlanIdCtrl=1:1:[#WlanID2]:0**
  - **iwpriv ra0 set TpcUlAlgoCtrl=1:0:[#TF_RSSI]**
  - **iwpriv ra0 set TpcUlAlgoCtrl=1:1:[#TF_RSSI]**
    - //#TF_RSSI = (Rssi_dBm + 110)=0~90, Set TF_RSSI=127: STA MAX POWER

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