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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

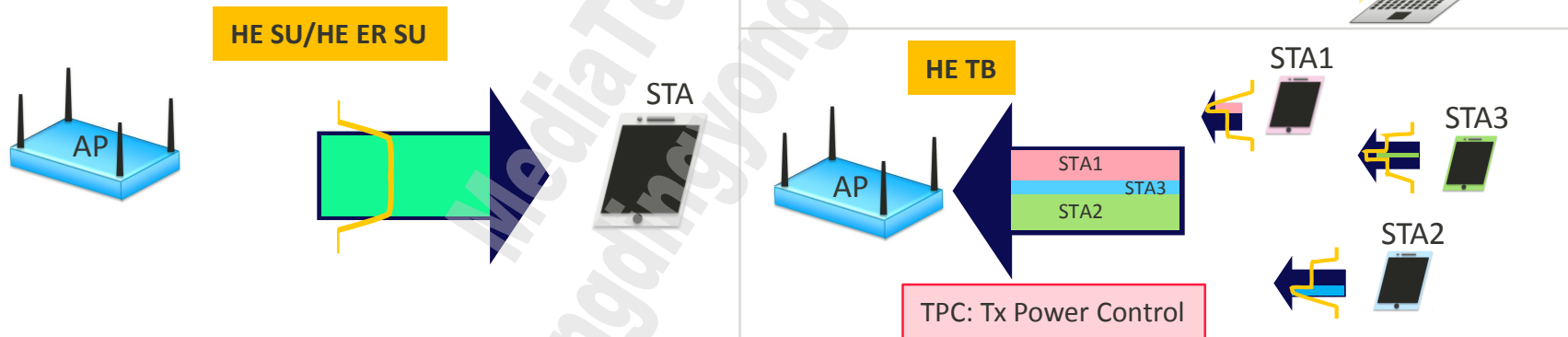
- ❑ TPC Feature Introduction
- ❑ How to Configure – profile
- ❑ How to Configure – runtime command

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

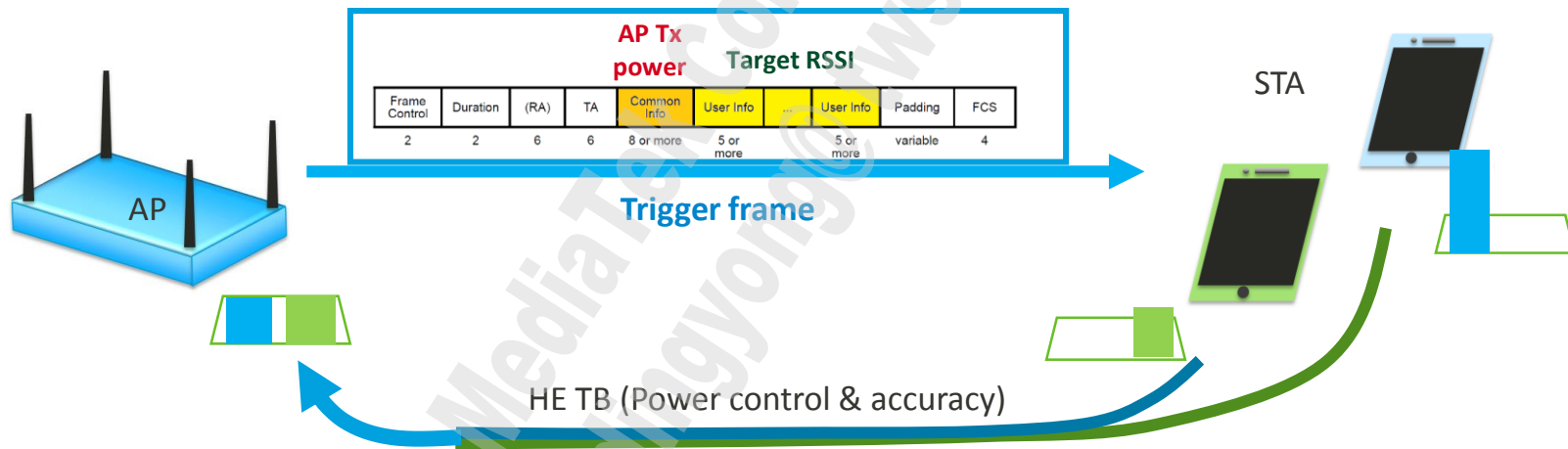


TPC (Tx Power Control)

- 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 $Tx_{pwr}^{STA} = Tx_{pwr}^{AP} - DL_{RSSI} + Target_{RSSI}$

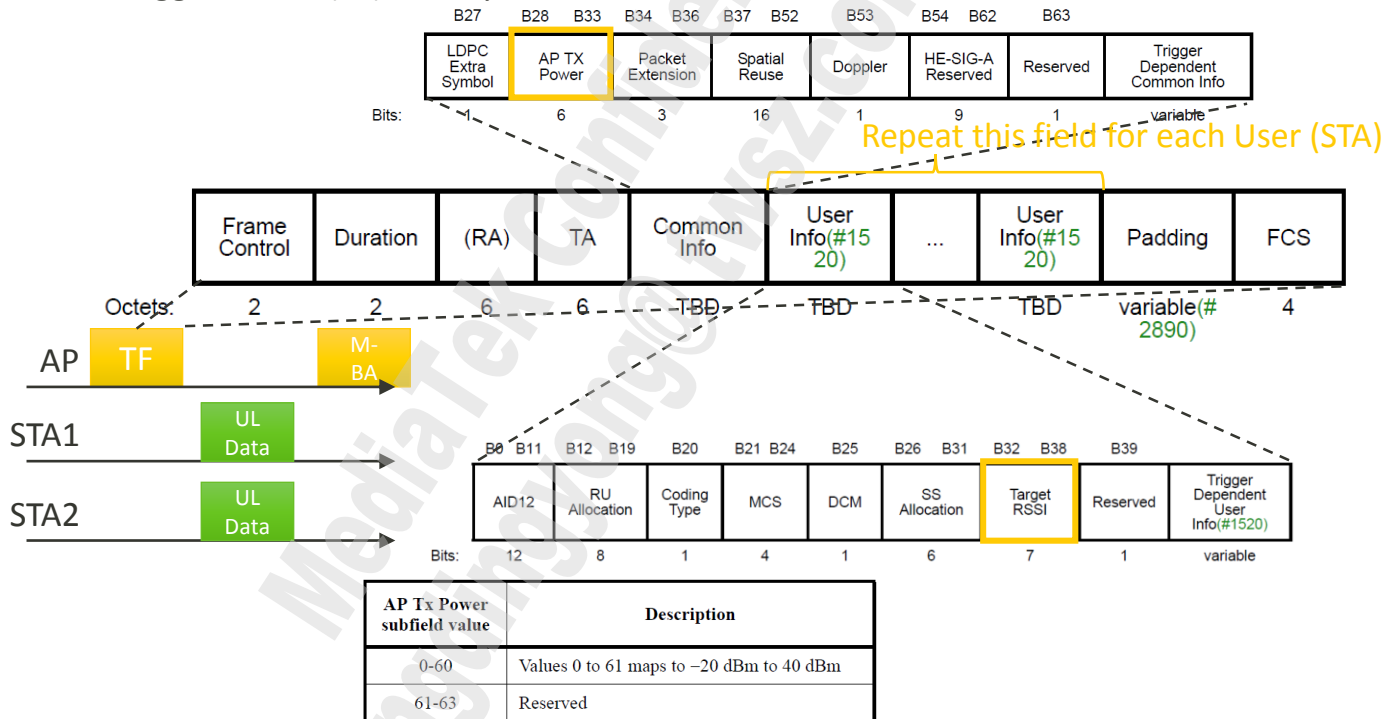
TPC (Tx Power Control)

- In order to meet target RSSI, STA would adjust the Tx power according to AP Tx power & it received RSSI



TPC in Trigger Frame

In Trigger Frame (TF) sent by AP



STA Power Headroom in HETB

Octets: 2	2	6	0 or 6	0 or 6	0 or 2	0 or 6	0 or 2	0 or 4	variable	4
Frame Control	Duration /ID	Address 1	Address 2	Address 3	Sequence Control	Address 4	QoS Control	HT Control	Frame Body	FCS

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		

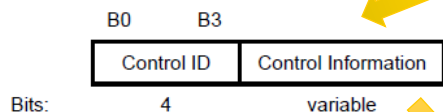
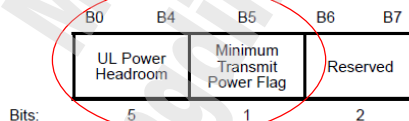


Figure 9-15b—Control subfield format

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 PPDU**
 - 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 TpcUIAlgoCtrl=1:0:[#TF_RSSI]**
 - **iwpriv ra0 set TpcUIAlgoCtrl=1:1:[#TF_RSSI]**
 - $//\#TF_RSSI = (Rssi_dBm + 110) = 0 \sim 90$, Set $TF_RSSI = 127$: STA MAX POWER

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