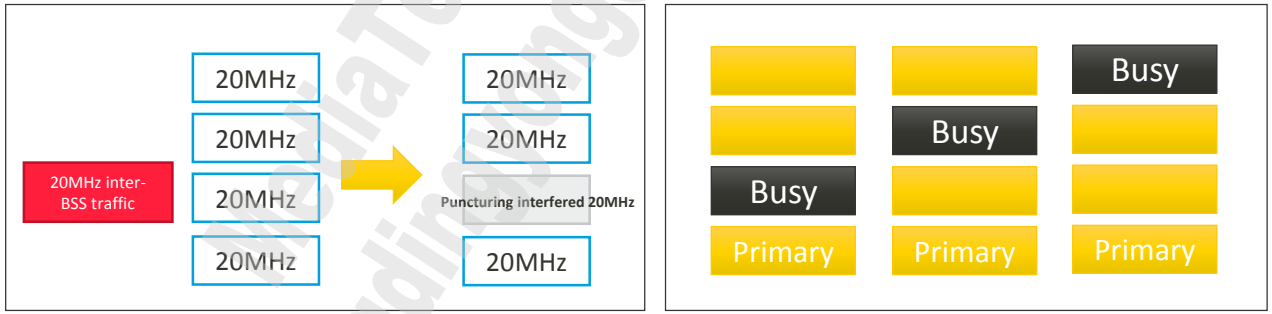
MT7986 Preamble Puncturing Application Note

Document History

Version	Date	Description	Note
1.0	2021.09.23	Initial version	

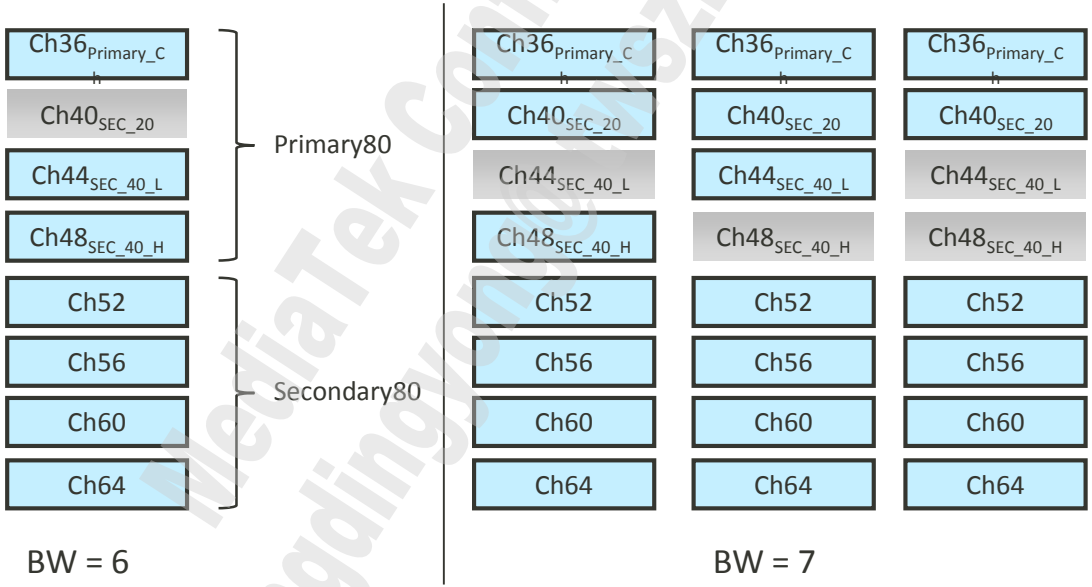
Preamble Puncturing

- Allow an 802.11ax AP to transmit a “punctured” 80/160 MHZ channel if some of the secondary channels are already in use by nearby legacy radio
- Preamble puncturing is only for MU-OFDMA and BW 80/160MHz
- Only one 20MHz sub-channel can be punctured @BW80MHz



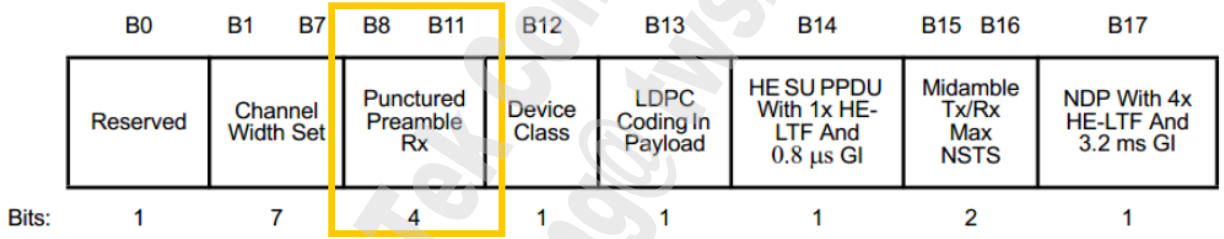
Preamble Puncturing

- **BW160: <= 3 x 20MHz sub-channels can be punctured @sec_80**



HE PHY Capability

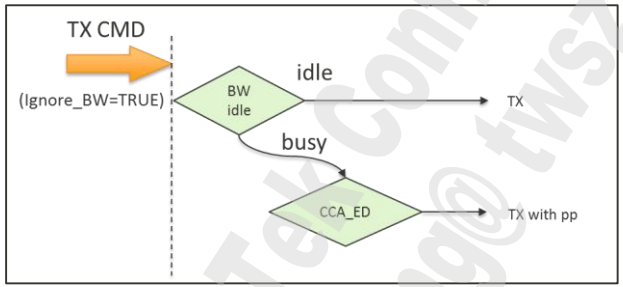
- **Punctured Preamble RX will be specified in HE PHY Capabilities Information field**

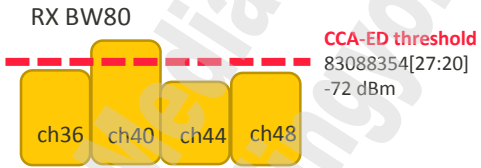


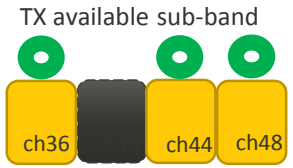
Subfield	Definition	Encoding
Punctured Preamble Rx	B0 indicates support for the reception of an 80 MHz preamble where the secondary 20 MHz subchannel is punctured. B1 indicates support for the reception of an 80 MHz preamble where one of the two 20 MHz subchannels in the secondary 40 MHz is punctured. B2 indicates support for the reception of a 160 MHz or 80+80 MHz preamble where in the primary 80 MHz of the preamble only the secondary 20 MHz is punctured. B3 indicates support for the reception of a 160 MHz or 80+80 MHz preamble where in the primary 80 MHz of the preamble, the primary 40 MHz is present.	B0 is set to 0 if not supported. B0 set to 1 if supported. B1 set to 0 if not supported. B1 set to 1 if supported. B2 set to 0 if not supported. B2 set to 1 if supported. B3 set to 0 if not supported. B3 set to 1 if supported.

RX Clear Channel Assessment - Energy Detect (CCA-ED)

- **According to CCA-ED status to do preamble puncturing**

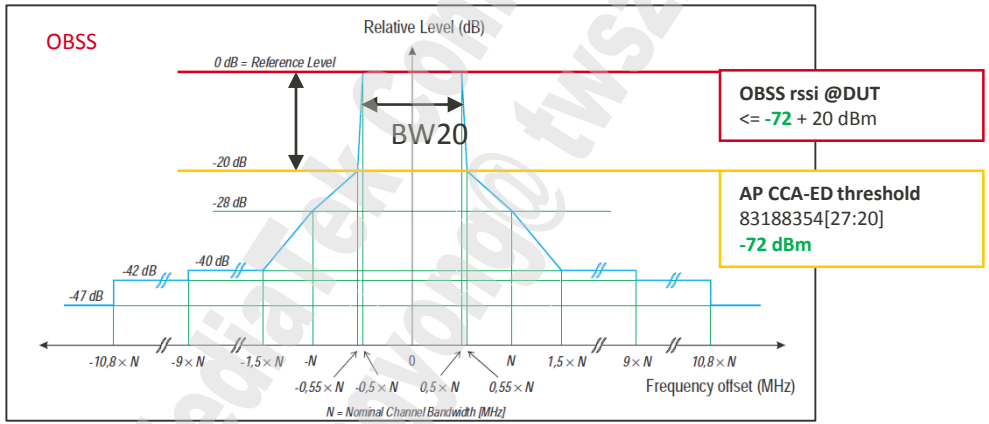






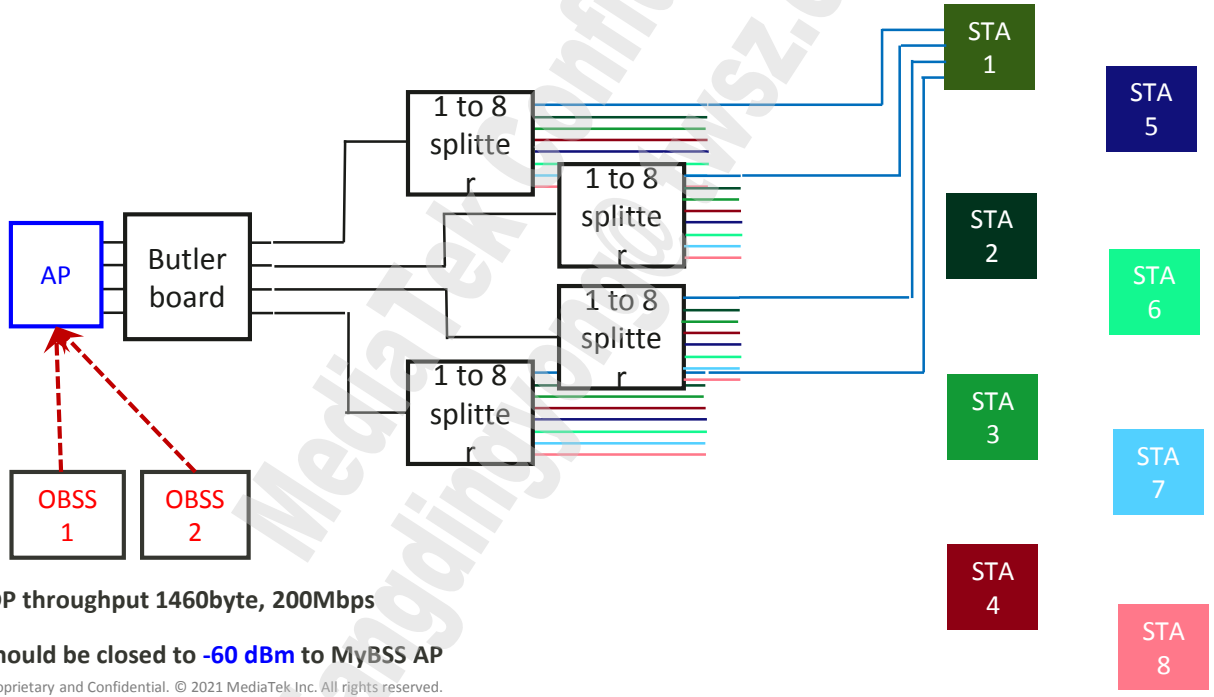
RX Clear Channel Assessment - Energy Detect (CCA-ED)

- **Transmit spectral power mask**



Panther Preamble Puncturing Environment Setup

- Cable mode, 5G BW160, 2ss, 8STAs



- 8 STAs run UDP throughput 1460byte, 200Mbps
- rssi of OBSS should be closed to -60 dBm to MyBSS AP

Panther Preamble Puncturing Result

Preamble Puncturing Panther		CH36 (P)	CH40	CH44	CH48	CH52	CH56	CH60	CH64
Case	Test item								
0	No OBSS								
1	Punc_sec20		QA tool1						
2	Punc_sec20		QA tool1			QA tool2			
3	Punc_sec40			QA tool2					
4	Punc_sec40			QA tool1				QA tool2	
5	Punc_sec40				QA tool1				

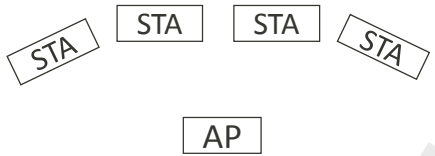
Test case	SU	RU+PP	RU+PP gain
0	1389	1512	9%
1	705 TOTAL AIRTIME_IN_UNIT: 50.07%	1095 TOTAL AIRTIME_IN_UNIT: 81.17%	55%
2	282 TOTAL AIRTIME_IN_UNIT: 20.55%	525 TOTAL AIRTIME_IN_UNIT: 46.56%	86%
3	373 TOTAL AIRTIME_IN_UNIT: 40.33%	569 TOTAL AIRTIME_IN_UNIT: 74.72%	53%
4	560 TOTAL AIRTIME_IN_UNIT: 41.97%	766 TOTAL AIRTIME_IN_UNIT: 73.86%	37%
5	1092 TOTAL AIRTIME_IN_UNIT: 77.96%	1481 TOTAL AIRTIME_IN_UNIT: 96.56%	36%

Static Check

- CFG_SUPPORT_FALCON_PP=y
- Key parameters in 5G profile
  - PPEnable=1 (default value is set to FALSE)
  - HT_BW=1
  - VHT_BW=1/2
- PP iwpriv cmd
  - Enable PP: iwpriv rax0 set ppcapctrl=0-1-0;
  - Disable PP: iwpriv rax0 set ppcapctrl=0-0-0;

PP SOP

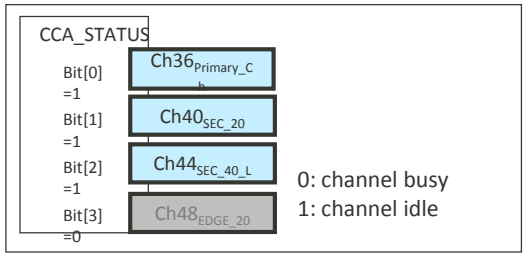
- 1. Check fixed RU / SU have similar throughput performance
  - if RU has bad mcs rate/PER, location between AP/STAs should be adjusted




```
#Fix 4 * 242 tone plan
iwpriv rax0 set set_muru_manual_config=dl_comm_bw:2;
iwpriv rax0 set set_muru_manual_config=dl_comm_user_cnt:4;
iwpriv rax0 set set_muru_manual_config=dl_comm_toneplan:192:192:192:192:0;
iwpriv rax0 set set_muru_manual_config=dl_user_ru_alloc:0:61:0:62:0:63:0:64;
iwpriv rax0 set set_muru_manual_config=update;
```

- 2. rssi of OBSS should be closed to **-60 dBm** to MyBSS AP
- 3. When PP is enabled, CCA_status=0x7 in TX cmd report should be more than 70%

```
# cancel fix ru cmd
iwpriv rax0 set set_muru_manual_config=dl_init;
iwpriv rax0 set set_muru_manual_config=update;
# enable DL OFDMA
iwpriv rax0 set ppcapctrl=0-1-0;
# enable PP
iwpriv rax0 set ppcapctrl=0-1-0;
```



Note

- Other conditions to execute PP
  - DL OFMDA is supported by STA
  - RU num >=4 @BW80
  - RU num >=8 @BW160