UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

KREATOSPHERE LLC, Plaintiff, v. **MOTOROLA MOBILITY LLC,** Defendant.	C.A. No. 1:26-cv-08498 **JURY TRIAL DEMANDED** **PATENT CASE**

ORIGINAL COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Kreatosphere LLC files this Original Complaint for Patent Infringement against Motorola Mobility LLC and would respectfully show the Court as follows:

I. THE PARTIES

1. Plaintiff Kreatosphere LLC ("Plaintiff") is a Texas limited liability company with a principal place of business located at 2701D West 15th Street, #572, Plano, Texas 75075.

2. On information and belief, Defendant Motorola Mobility LLC ("Defendant") is a limited liability company organized and existing under the laws of Delaware with a place of business at 222 W Merchandise Mart Plaza, Suite 1800 Chicago, Illinois 60654. Defendant has a registered agent C T Corporation System at 208 So. LaSalle Street, Suite 814, Chicago, Illinois 60604.

II. JURISDICTION AND VENUE

3. This action arises under the patent laws of the United States, Title 35 of the United States Code. This Court has subject matter jurisdiction of such action under 28 U.S.C. §§ 1331 and 1338(a).

4. On information and belief, Defendant is subject to this Court's specific and general personal jurisdiction, pursuant to due process and the Illinois Long-Arm Statute, due at least to its

business in this forum, including at least a portion of the infringements alleged herein. Furthermore, Defendant is subject to this Court's specific and general personal jurisdiction because Defendant maintains a place of business at 222 W Merchandise Mart Plaza, Suite 1800 Chicago, Illinois 60654.

5. Without limitation, on information and belief, within this state and this District, Defendant has used the patented inventions thereby committing, and continuing to commit, acts of patent infringement alleged herein. In addition, on information and belief, Defendant has derived revenues from its infringing acts occurring within Illinois and this District. Further, on information and belief, Defendant is subject to the Court's general jurisdiction, including from regularly doing or soliciting business, engaging in other persistent courses of conduct, and deriving substantial revenue from services provided to persons or entities in Illinois and this District. Further, on information and belief, Defendant is subject to the Court's personal jurisdiction at least due to its providing services within Illinois and this District. Defendant has committed such purposeful acts and/or transactions in Illinois and this District such that it reasonably should know and expect that it could be haled into this Court as a consequence of such activity.

6. Venue is proper in this district under 28 U.S.C. § 1400(b). On information and belief, Defendant maintains a place of business at 222 W Merchandise Mart Plaza, Suite 1800 Chicago, Illinois 60654. On information and belief, from and within this District Defendant has committed at least a portion of the infringements at issue in this case.

7. For these reasons, personal jurisdiction exists and venue is proper in this Court under 28 U.S.C. § 1400(b).

III. UNITED STATES PATENT NO. 8,265,575

8. Plaintiff incorporates the above paragraphs herein by reference.

9. On September 11, 2012, United States Patent No. 8,265,575 ("the '575 Patent") was duly and legally issued by the United States Patent and Trademark Office. The '575 Patent is titled "Methods for Handling a Transmitting Process and Communication Apparatuses Utilizing the Same." A true and correct copy of the '575 Patent is attached hereto as Exhibit 1 and incorporated herein by reference.

10. Kreatosphere LLC is the assignee of all right, title, and interest in the '575 Patent, including all rights to enforce and bring actions for infringement and to collect damages for all relevant times against infringers of the '575 Patent. Accordingly, Kreatosphere LLC possesses the exclusive right and standing to bring the present action for infringement of the '575 Patent by Defendant.

11. The invention in the '575 Patent relates to a method for handling a transmitting process of a communication apparatus, and more particularly to a method for handling a transmitting process with reduced power consumption. (Ex. 1 at 1:9-12). The goal of the '575 Patent is to improve the power usage of communication devices utilizing Orthogonal Frequency Division Multiple Access ("OFDMA") using a method that more efficiently handles the transmitting process. (*Id.* at 1:14-35). To do this, the '575 Patent discloses a communication apparatus with a power amplifier that amplifies a plurality of up-link messages before the up-link messages are transmitted by an antenna. (*Id.* at 2:10-13). The communication apparatus receives a bit stream comprising information indicating corresponding transmitting time and a sub-carrier frequency of the up-link messages. (*Id.* at 2:14-15). The communication apparatus then prepares the up-link messages to be transmitted according to the information. (*Id.* at 2:15-17). The communication apparatus generates a control signal to the power amplifier according to the information. (*Id.* at 2:17-19). The communication apparatus switches on the power amplifier

during a first time interval of a data frame and switches off the power amplifier during a second time interval of the data frame according to the control signal, wherein during the second time interval of the data frame, there is no up-link message to be transmitted. (*Id*. at 2:19-24). Thus, instead of switching on the power amplifier all the time during the up-link period of a data frame, the on and off time of the power amplifier may be flexibly controlled. (*Id.* at 4:43-46, 54-58). By switching off the power amplifier when there is no up-link message to be transmitted, power consumption is reduced. (*Id.* at 4:61-66).

Asserted Claim

12. Claim 11 of the '575 Patent claims:

> A method for handling a transmitting process of a communication apparatus in a communication system, wherein the communication apparatus comprises a power amplifier amplifying a plurality of up-link messages before the up-link messages are transmitted by an antenna, comprising:
>
> receiving a bit stream comprising information indicating corresponding transmitting time and Sub-carrier frequencies of the up-link messages;
>
> preparing the up-link messages to be transmitted according to the information;
>
> generating a control signal to the power amplifier according to the information; and,
>
> wherein the control signal indicates switching on the power amplifier during a first time interval of a data frame and switching off the power amplifier during a second time interval of the data frame, wherein during the second time interval of the data frame, there is no up-link message to be transmitted.

IV. COUNT I
(PATENT INFRINGEMENT OF UNITED STATES PATENT NO. 8,265,575)

13. Upon information and belief, Defendant has directly infringed claim 11 of the '575 Patent in Illinois, in this District, and elsewhere in the United States, by using and performing the claimed method by using the Motorola Razr ("Accused Instrumentality").

14. **Direct Infringement**. As explained below, the Accused Instrumentality practices a method for handling a transmitting process of a communication apparatus (*e.g.,* Motorola Razr smartphone) in a communication system (*e.g.,* a Wi-Fi network system), wherein the communication apparatus (*e.g.,* Motorola Razr smartphone) comprises a power amplifier (*e.g.,* a power amplifier or PA of the Front End Module) amplifying a plurality of up-link messages (*e.g.,* Data field in the PPDU) before the up-link messages (*e.g.,* Data field in the PPDU) are transmitted by an antenna (*e.g.,* antenna of the Front End Module), receiving a bit stream comprising information (*e.g.,* Trigger frame) indicating corresponding transmitting time (*e.g.,* transmitting opportunity duration) and sub-carrier frequencies (*e.g.,* subcarrier and resource allocation) of the up-link messages (*e.g.,* Data field in the PPDU). As shown below, the Accused Instrumentality supports Wi-Fi 6 connectivity by utilizing a Front-End Module. This NXP Wi-Fi 6 Front End module comprises integrated power amplifiers with multiple operation modes. The Accused Instrumentality follows Wi-Fi 6 or IEEE 802.11ax standard. The standard discloses that a non-AP HE STA (*e.g.,* the Accused Instrumentality) receives a trigger frame (*e.g.,* bit stream) from an access point. The non-AP HE STA gets transmission opportunity on receiving the trigger frame. The trigger frame comprises details of transmitting duration and resource unit information (*e.g.,* sub-carrier frequencies).

Click to see full view

Motorola razr | 2023 | Unlocked | Made for US 8/128 | 32MP Camera | Sage Green

Visit the Motorola Store

3.9 (1,047) | Search this page

Color: **Sage Green**

2 options from $302.66	4 options from $204.97	3 options from $262.43	2 options from $273.90

Product details

Brand	Motorola
Cellular Technology	5G
Operating System	Android 13.0
Ram Memory Installed Size	8 GB

(*E.g.*, https://www.amazon.com/Motorola-Unlocked-Camera-170-82-7-35mm/dp/B0CGVXZSQJ?th=1).

Specifications - motorola razr (2023)

Performance

Operating system - Android 13

Internal storage - 128GB built-in UFS 2.2

Sensors - Fingerprint reader, Proximity sensor, Ambient light sensor, Ultra-Sonic sensor, Accelerometer + Gyroscope, eCompass, Hall sensor, Barometer

Processor - Snapdragon 7 Gen 1 Mobile Platform

Memory (RAM) - 8GB LPDDR4X

Security - Side fingerprint reader, Face unlock

(*E.g.*, https://en-us.support.motorola.com/app/answers/detail/a_id/176643/~/specifications---motorola-razr---2023).

Connectivity

Networks + Bands
5G | 4G: LTE (Cat18) | 3G: UMTS / HSPA+ | 2G: GSM / EDGE
3G: GSM QB; W1/2/4/5/8
4G: B1/2/3/4/5//7/8/12/13/14/18/20/25/26/28/29/30/38/39/40/41/46/48/66/71
5G7 sub-6: N1/2/3/5/7/12/14/20/25/26/28/29/30/41/48/66/71/77/78

Bluetooth Technology - Bluetooth® 5.3

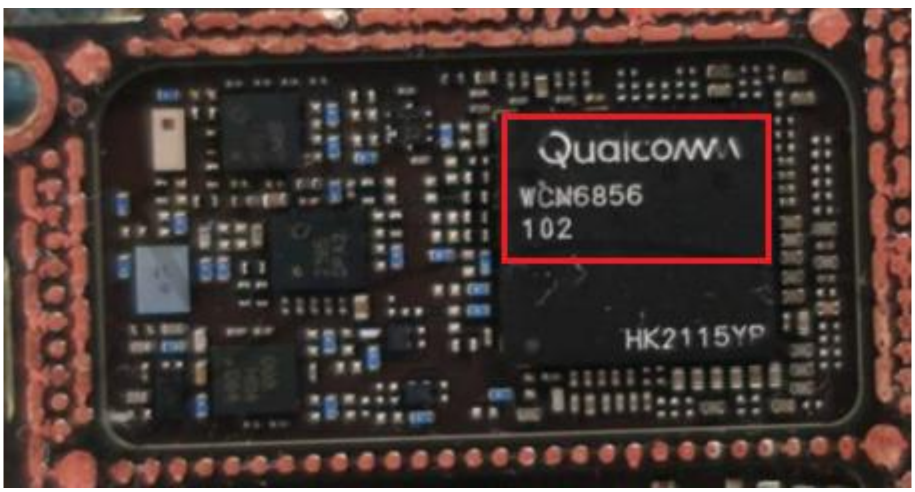
NFC - Yes

Wi-Fi - 802.11 a/b/g/n/ac/ax/Wi-Fi 6e 2.4GHz & 5GHz & 6GHz Wi-Fi hotspot

Location Services - GPS, A-GPS, LTEPP, SUPL, GLONASS, Galileo

SIM Card - eSIM + physical SIM

(*E.g.*, https://en-us.support.motorola.com/app/answers/detail/a_id/176643/~/specifications---motorola-razr---2023).



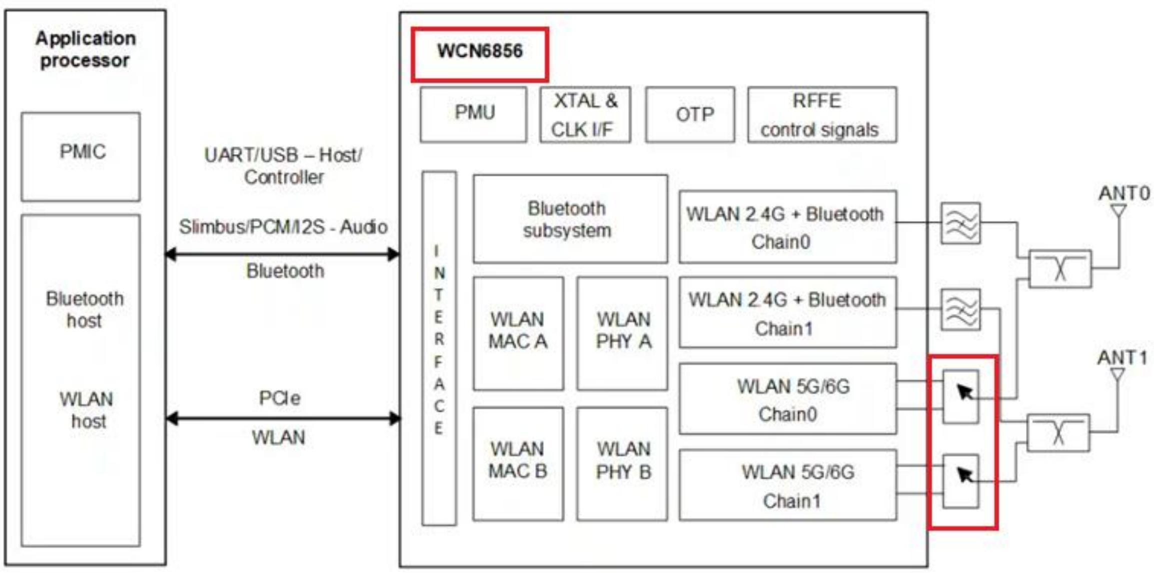
(*Teardown of the Accused Instrumentality*).

Device description

The WCN6856 device is a highly integrated system-on-chip (SoC) that supports 802.11ax Wi-Fi and Bluetooth® 5.3. The WCN6856 supports simultaneous operation on 2.4 GHz and 5 GHz or 6 GHz, also known as Dual Band Simultaneous (DBS).

For the complete features and system specifications, see WCN6856 Tri-Band 2x2 MIMO DBS 802.11ax + Bluetooth 5.3 Data Sheet (80-WL542-1).

(*E.g.*, https://docs.qualcomm.com/doc/80-WL542-10/topic/overview.html).



(*E.g.*, https://docs.qualcomm.com/doc/80-WL542-10/topic/overview.html).

Part Numbers

Product	Part Number
FastConnect 6900 supports low power PCIe interface and UART interface for Bluetooth	WCN685x-1
FastConnect 6900 supports low power PCIe interface and USB 1.1 for Bluetooth	WCN685x-5

(*E.g.*, https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/qualcomm-fastconnect-6900-product-brief_finalv7.pdf).

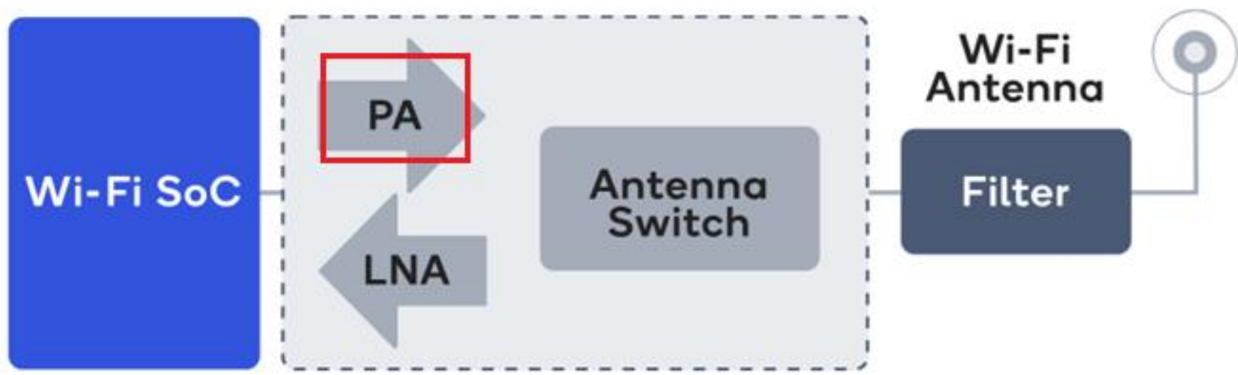
Fully Integrated front end module designed for Wi-Fi

Our Qualcomm® QXM108x Wi-Fi Front End Modules (FEMs) are comprised of small size RFFEs with integrated active and passive components used to cover the wide breadth of IEEEE802.11b/g/ac/ax/be applications. Our latest offering includes integrated power amplifiers, low noise amplifiers, switches, and directional couplers. The latest Wi-Fi air interface standards are supported, including Wi-Fi 6, Wi-Fi 6E and Wi-Fi 7.

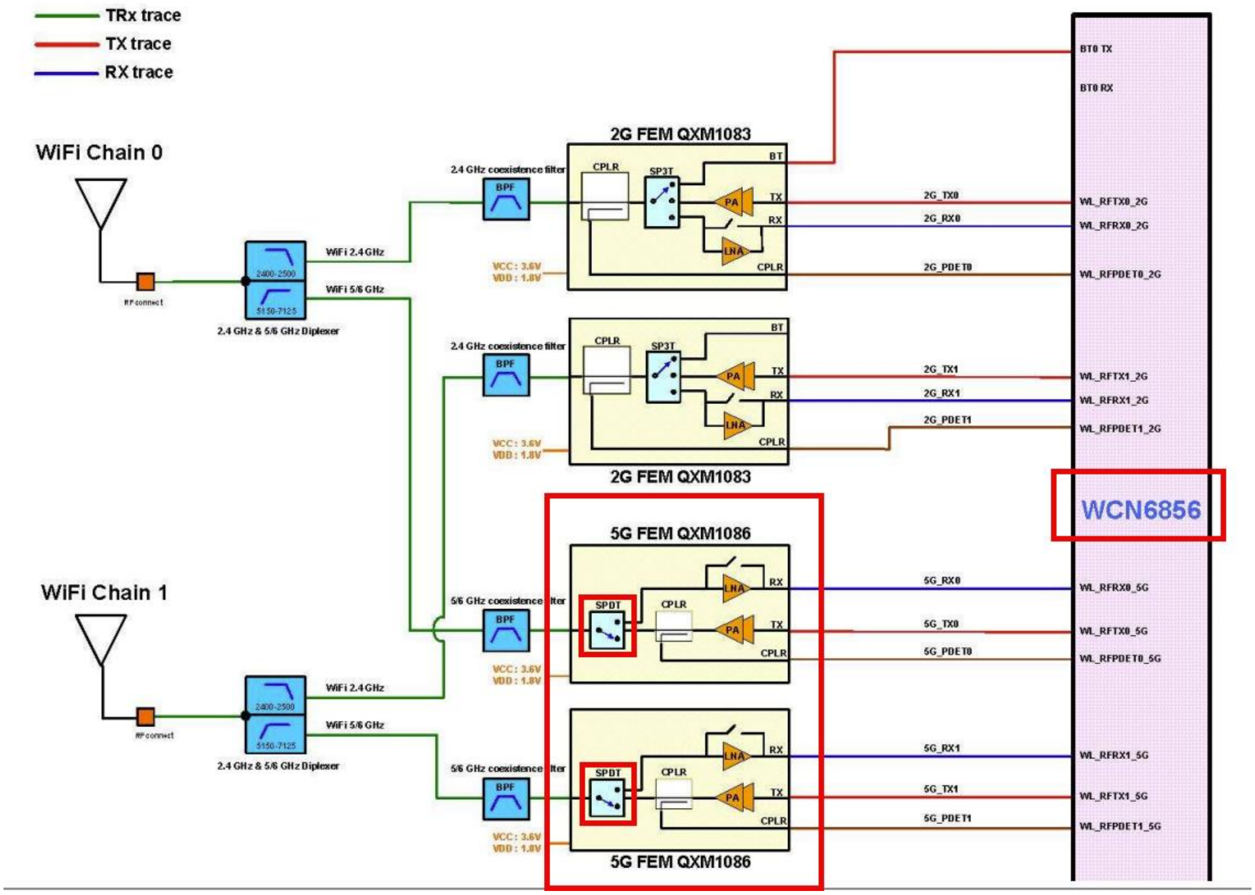
Paired with the latest Qualcomm® FastConnect 6900 and Qualcomm® FastConnect 7800 Wi-Fi solutions, our Qualcomm® QXM108x Wi-Fi Front End Modules deliver a comprehensive modem-to-antenna system for flexible, cost-effective, high-performance Wi-Fi connected experiences.

This product line enables OEMs to quickly develop and launch powerful Wi-Fi solutions at scale with 5G NR and Bluetooth concurrency while attaching to the broad applications of Snapdragon® Mobile, Computing and AR/VR Platforms.

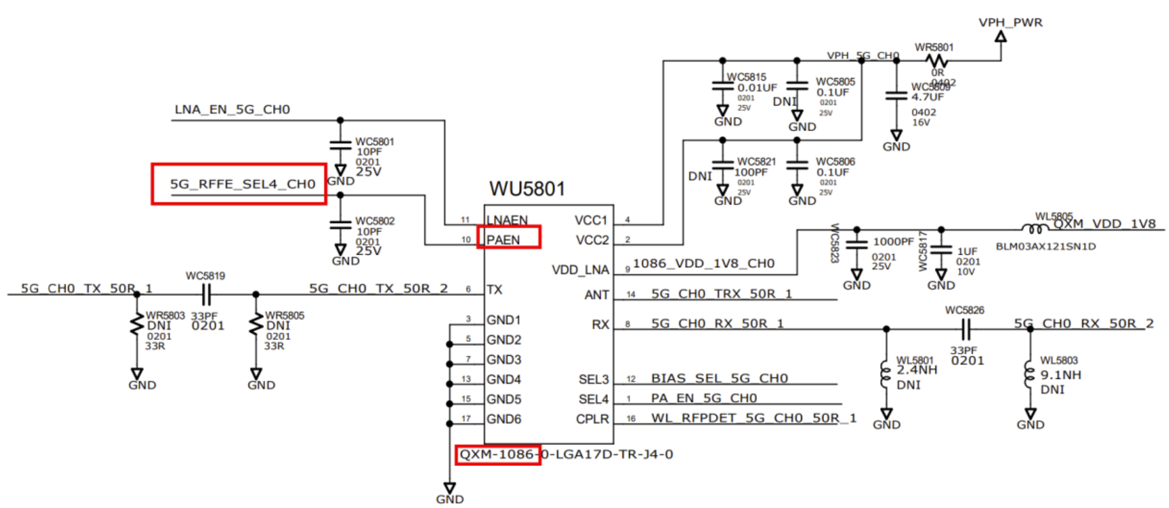
(*E.g.*, https://www.qualcomm.com/modems/rf/products/qxm108x).



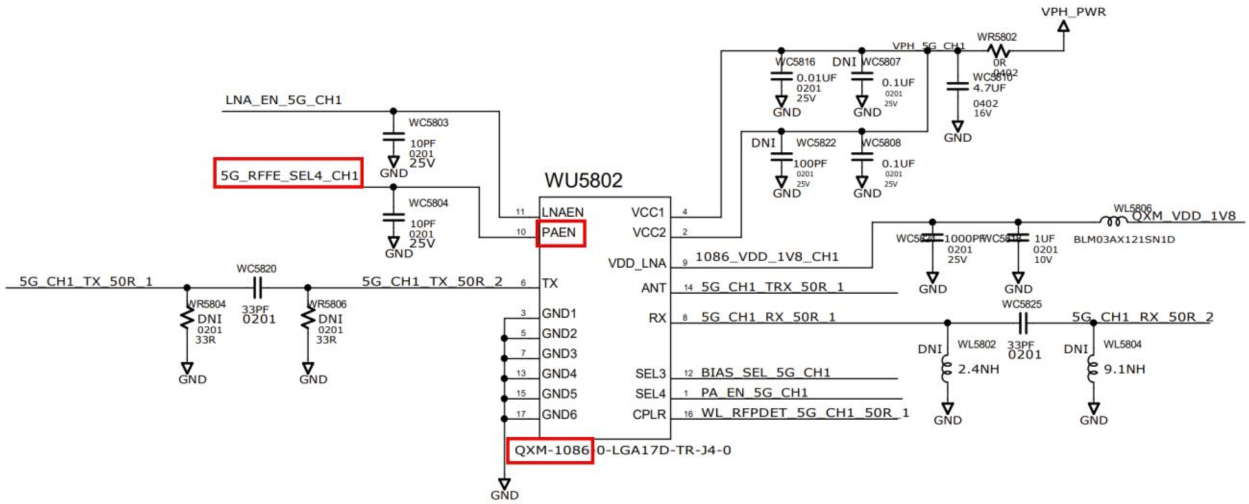
(*E.g.*, https://www.qualcomm.com/modems/rf/products/qxm108x).



(*E.g.*, https://fcc.report/FCC-ID/UZ7WT0/7289507.pdf).



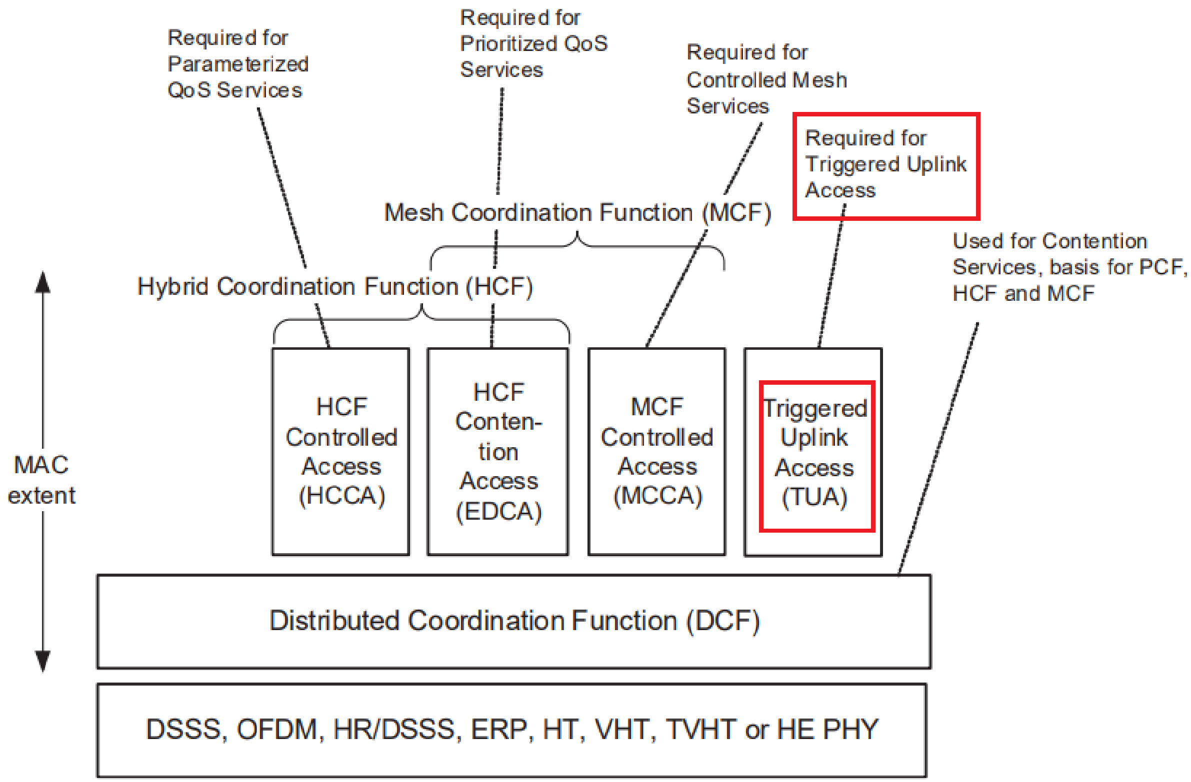
(*E.g.*, https://fcc.report/FCC-ID/UZ7WT0/7289507.pdf).



(*E.g.*, https://fcc.report/FCC-ID/UZ7WT0/7289507.pdf).

> The MAC functional description is presented in this clause. The architecture of the MAC sublayer, including the distributed coordination function (DCF), the hybrid coordination function (HCF), the mesh coordination function (MCF), the triggered UL access (TUA), and their coexistence in an IEEE 802.11 LAN are introduced in 10.2. These functions are expanded on in 10.3, 10.23, ~~and~~ 10.24, and 26.2. Fragmentation and defragmentation are defined in 10.4 and 10.5. Multirate support is addressed in 10.6. A number of additional restrictions to limit the cases in which MSDUs are reordered or discarded are described in 10.7. Operation across regulatory domains is defined in 10.22. The block ack mechanism is described in 10.25. The No Ack mechanism is described in 10.26. The protection mechanism is described in 10.27. Rules for processing MAC frames are described in 10.28.

(*E.g.*, IEEE 802.11ax standard).



(*E.g.*, IEEE 802.11ax standard).

triggered uplink access (TUA): A mechanism by which one or more non-access-point (non-AP) stations (STAs) simultaneously participate in an uplink (UL) transmission to an access point (AP) using resource units (RUs) allocated in the preceding Trigger frame.

triggering frame: A Trigger frame or a frame carrying a TRS Control subfield.

(*E.g.*, IEEE 802.11ax standard).

The main PHY features in an HE STA that are not present in VHT STA or HT STA are the following:

- Mandatory support for DL and UL OFDMA
- Mandatory support for DL MU-MIMO by an HE AP that supports 4 or more spatial streams when MU-MIMO is done on the entire PPDU bandwidth
- Mandatory support for DL MU-MIMO reception for a non-AP HE STA
- Mandatory support for the HE sounding protocol to support beamforming for a non-AP STA beamformee and optional otherwise
- Optional support for HE-MCSs 10 and 11
- Optional support for UL MU-MIMO
- Optional support for preamble puncturing

(*E.g.*, IEEE 802.11ax standard).

An HE AP sends a Trigger frame to initiate UL MU operation using UL OFDMA or UL MU-MIMO transmissions or a frame containing a TRS Control subfield to initiate UL OFDMA transmissions. The frame initiating these transmissions in the uplink direction is a triggering frame. The triggering frame identifies non-AP STAs participating in UL MU operation and assigns RUs and/or spatial streams to these STAs. Multi-STA BlockAck frames can be used by the AP to acknowledge the frames transmitted by multiple non-AP STAs. The scheduling of these Trigger frames can be set up between a non-AP STA and the AP using TWT operation to save power and reduce collisions.

9.3.1.22 Trigger frame format

9.3.1.22.1 General

A Trigger frame allocates resources for and solicits one or more HE TB PPDU transmissions. The Trigger frame also carries other information required by the responding STA to send an HE TB PPDU.

The format for the Trigger frame is defined in Figure 9-64a.

	MAC header							
	Frame Control	Duration	RA	TA	Common Info	User Info List	Padding	FCS
Octets:	2	2	6	6	8 or more	variable	variable	4

Figure 9-64a—Trigger frame format

The Duration field is set as defined in 9.2.5.

(*E.g.*, IEEE 802.11ax standard).

> 7) In a Basic Trigger frame, the Duration/ID field is set to the estimated time required to transmit the solicited HE TB PPDU, plus the estimated time required to transmit the acknowledgment for the solicited HE TB PPDU if required, plus applicable SIFSs.
>
> Multiple protection settings. The Duration/ID field is set to a value D as follows:
>
> ...
>
> 4) Else $T_{END-NAV} - T_{PPDU} \leq D \leq T_{TXOP-REMAINING} - T_{PPDU}$
>
> where
>
> | | |
> |---|---|
> | $T_{SINGLE\text{-}MSDU}$ | is the estimated time required for the transmission of the allowed frame exchange sequence defined in 10.23.2.9 (for a TXOP limit of 0), including applicable IFS durations |
> | $T_{PENDING}$ | is the estimated time required for the transmission of
— Pending MPDUs ~~of the same AC~~
— Any associated immediate response frames
— Any HT NDP, VHT NDP, HE sounding NDP, or Beamforming Report Poll frame transmissions and explicit feedback response frames
— Applicable IFSs
— Any RDG
— Any BDT
— Any pending QoS Null frame exchanges by paged STAs
— Any pending PS-Poll or NDP PS-Poll frame exchanges by paged STAs |
> | T_{TXOP} | is the duration given by dot11EDCATableTXOPLimit (dot11QAPEDCATableTXOPLimit for the AP) for that AC |
> | $T_{TXOP\text{-}REMAINING}$ | is T_{TXOP} less the time already used time within the TXOP |
> | $T_{END\text{-}NAV}$ | is the remaining duration of any NAV set by the TXOP holder, or 0 if no NAV has been established |
> | T_{PPDU} | is the time required for transmission of the current PPDU |

(*E.g.*, IEEE 802.11ax standard).

The Common Info field is defined in Figure 9-64b.

	B0 B3	B4 B15	B16	B17	B18 B19	B20 B21	B22	B23 B25
	Trigger Type	UL Length	More TF	CS Required	UL BW	GI And HE-LTF Type	MU-MIMO HE-LTF Mode	Number Of HE-LTF Symbols And Midamble Periodicity
Bits:	4	12	1	1	2	2	1	3

	B26	B27	B28 B33	B34 B35	B36	B37 B52	B53	B54 B62
	UL STBC	LDPC Extra Symbol Segment	AP Tx Power	Pre-FEC Padding Factor	PE Disambiguity	UL Spatial Reuse	Doppler	UL HE-SIG-A 2 Reserved
Bits:	1	1	6	2	1	16	1	9

	B63	
	Reserved	Trigger Dependent Common Info
Bits:	1	variable

Figure 9-64b—Common Info field format

(*E.g.*, IEEE 802.11ax standard).

The UL BW subfield of the Common Info field indicates the bandwidth in the HE-SIG-A field of the HE TB PPDU and is defined in Table 9-29d.

Table 9-29d—UL BW subfield encoding

UL BW subfield value	Description
0	20 MHz
1	40 MHz
2	80 MHz
3	80+80 MHz or 160 MHz

(*E.g.*, IEEE 802.11ax standard).

The User Info field is defined in Figure 9-64d for all Trigger frame variants, except the NFRP Trigger frame, which is defined in 9.3.1.22.9.

	B0 B11	B12 B19	B20	B21 B24	B25	B26 B31	B32 B38	B39	
	AID12	RU Allocation	UL FEC Coding Type	UL HE-MCS	UL DCM	SS Allocation/ RA-RU Information	UL Target Receive Power	Reserved	Trigger Dependent User Info
Bits:	12	8	1	4	1	6	7	1	variable

Figure 9-64d—User Info field format

The AID12 subfield in the User Info field is encoded as defined in Table 9-29h:

Table 9-29h—AID12 subfield encoding

AID12 subfield	Description
0	User Info field allocates one or more contiguous RA-RUs for associated STAs
1–2007	User Info field is addressed to an associated STA whose AID is equal to the value in the AID12 subfield
2008–2044	Reserved
2045	User Info field allocates one or more contiguous RA-RUs for unassociated STAs
2046	Unallocated RU
2047–4094	Reserved
4095	Start of Padding field

If the AID12 subfield is 2046, then the remaining subfields in the User Info field are reserved, except for the RU Allocation subfield, which indicates the RU location of the unallocated RU.

(*E.g.*, IEEE 802.11ax standard).

27.3.2 Subcarrier and resource allocation

27.3.2.1 General

An OFDM symbol is constructed of subcarriers, the number of which is a function of the PPDU bandwidth. There are several subcarrier types:

a) Data subcarriers, which are used for data transmission (see 27.3.2.2).
b) Pilot subcarriers, which are used for phase information and parameter tracking (see 27.3.2.4).
c) Unused subcarriers, which are not used for either data or pilot transmission. The unused subcarriers are the DC subcarriers (see 27.3.2.2), the Guard band subcarriers at the band edges (see 27.3.2.2), and the Null subcarriers (see 27.3.2.3).

The following notations are used to describe the indices for a set of subcarriers:

— [$x1$:$y1$] represents the set of subcarriers with index k that satisfies $x1 \leq k \leq y1$.
— [$x1$:$y1$, $x2$:$y2$] represents the set of subcarriers with index k that satisfies either $x1 \leq k \leq y1$ or $x2 \leq k \leq y2$.

(*E.g.*, IEEE 802.11ax standard).

27.3.2.2 Resource unit, guard, and DC subcarriers

The RUs defined for DL and UL transmission are as follows: 26-tone RU, 52-tone RU, 106-tone RU, 242-tone RU, 484-tone RU, 996-tone RU, and 2×996-tone RU.

The 26-tone RU, 52-tone RU, 106-tone RU, and 242-tone RU are used in the 20 MHz, 40 MHz, 80 MHz, 160 MHz, and 80+80 MHz HE MU PPDU format. The 52-tone RU, 106-tone RU and 242-tone RU are used in the 20 MHz, 40 MHz, 80 MHz, 160 MHz, and 80+80 MHz HE TB PPDU format. The 26-tone RU is used in the 20 MHz, 40 MHz, 80 MHz, 160 MHz, and 80+80 MHz HE TB PPDU format unless a STA is operating in an operating class for which the behavior limits set listed in Annex E includes the DFS_50_100_Behavior (see 26.5.2.2.1 and 26.5.2.3). The 106-tone RU is used in the HE ER SU PPDU format.

The 484-tone RU is used in the 40 MHz, 80 MHz, 160 MHz, and 80+80 MHz HE MU PPDU and HE TB PPDU formats. The 996-tone RU is used in the 80 MHz, 160 MHz, and 80+80 MHz HE MU PPDU and HE TB PPDU formats. The 2×996-tone RU is used in the 160 MHz and 80+80 MHz HE MU PPDU format and 160 MHz and 80+80 MHz HE TB PPDU format.

The 242-tone and larger RUs are used in the HE SU PPDU format. The 242-tone RU is used in the 20 MHz HE SU PPDU and HE ER SU PPDU formats. The 484-tone RU is used in the 40 MHz HE SU PPDU format. The 996-tone RU is used in the 80 MHz HE SU PPDU format. The 2×996-tone RU is used in the 160 MHz and 80+80 MHz HE SU PPDU formats.

The maximum number of RUs in the 20 MHz, 40 MHz, 80 MHz, 160 MHz, and 80+80 MHz HE PPDU formats is defined in Table 27-6.

(*E.g.*, IEEE 802.11ax standard).

15. The Accused Instrumentality practices preparing the up-link messages (*e.g.*, Data field in the PPDU) to be transmitted according to the information (*e.g.*, transmitting opportunity duration and resource unit allocation).

27.3.4 HE PPDU formats

Four HE PPDU formats are defined: HE SU PPDU, HE MU PPDU, HE ER SU PPDU, and HE TB PPDU. The HE sounding NDP is a variant of the HE SU PPDU and defined in 27.3.17. The HE TB feedback NDP is a variant of the HE TB PPDU and defined in 27.3.18.

NOTE—The HE ER SU PPDU is not a variant of the HE SU PPDU. Requirements related to HE SU PPDUs and HE ER SU PPDUs are specified separately.

The format of the HE SU PPDU is defined as in Figure 27-8. This PPDU format is used for SU transmission, and in this format, the HE-SIG-A field is not repeated.

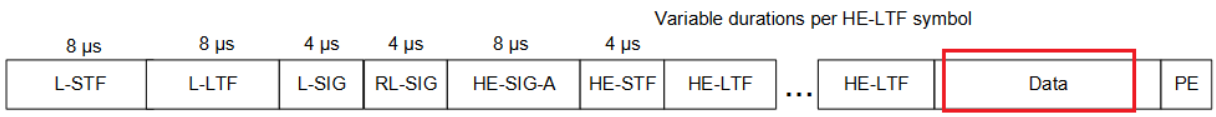


Figure 27-8—HE SU PPDU format

(*E.g.*, IEEE 802.11ax standard).

27.3.6.10 Construction of the Data field in an HE SU PPDU, HE ER SU PPDU, and HE TB PPDU

27.3.6.10.1 Using BCC

The construction of the Data field in an HE SU PPDU, HE ER SU PPDU, and HE TB PPDU with BCC encoding proceeds as follows:

a) Construct the SERVICE field as described in 27.3.12.3, and append the PSDU to the SERVICE field.

b) Pre-FEC padding: Append the pre-FEC pad bits and tail bits as described in 27.3.12.

c) Scrambler: Scramble the pre-FEC padded data.

d) BCC encoder: BCC encode as described in 27.3.12.5.1.

e) Post-FEC padding: Append the post-FEC pad bits and PE field as described in 27.3.12.

f) Stream parser: Rearrange the output of BCC encoder into blocks as described in 27.3.12.6.

g) BCC interleaver: Interleave as described in 27.3.12.8.

h) Constellation mapper: Map to BPSK, BPSK DCM, QPSK, QPSK DCM, 16-QAM, 16-QAM DCM, 64-QAM, or 256-QAM constellation points as described in 27.3.12.9.

i) STBC: Apply STBC as described in 27.3.12.12.

j) Pilot insertion: Insert pilots following the steps described in 27.3.12.13.

k) CSD: Apply CSD for each space-time stream and frequency segment as described in 27.3.11.2.2.

l) Spatial mapping: Apply the Q matrix as described in 27.3.12.14.

m) IDFT: In an 80+80 MHz transmission, map each frequency subblock to a separate IDFT. Compute the inverse discrete Fourier transform.

n) GI and windowing: Prepend a GI determined by the TXVECTOR parameter GI_TYPE, and apply windowing as described in 27.3.10.

o) Analog and RF: Upconvert the resulting complex baseband waveform with each transmit chain to an RF signal according to the center frequency of the desired channel and transmit. Refer to 27.3.10 and 27.3.11 for details.

(*E.g.*, IEEE 802.11ax standard).

fragmentation: The process of partitioning a medium access control (MAC) service data unit (MSDU), aggregate MAC service data unit (A-MSDU) or MAC management protocol data unit (MMPDU) into a sequence of smaller MAC protocol data units (MPDUs) prior to transmission. The process of recombining a set of fragment MPDUs into an MSDU, A-MSDU, or MMPDU is known as defragmentation. These processes are described in 5.8.1.9 of ISO/IEC 7498-1:1994.

(*E.g.*, IEEE 802.11ax standard).

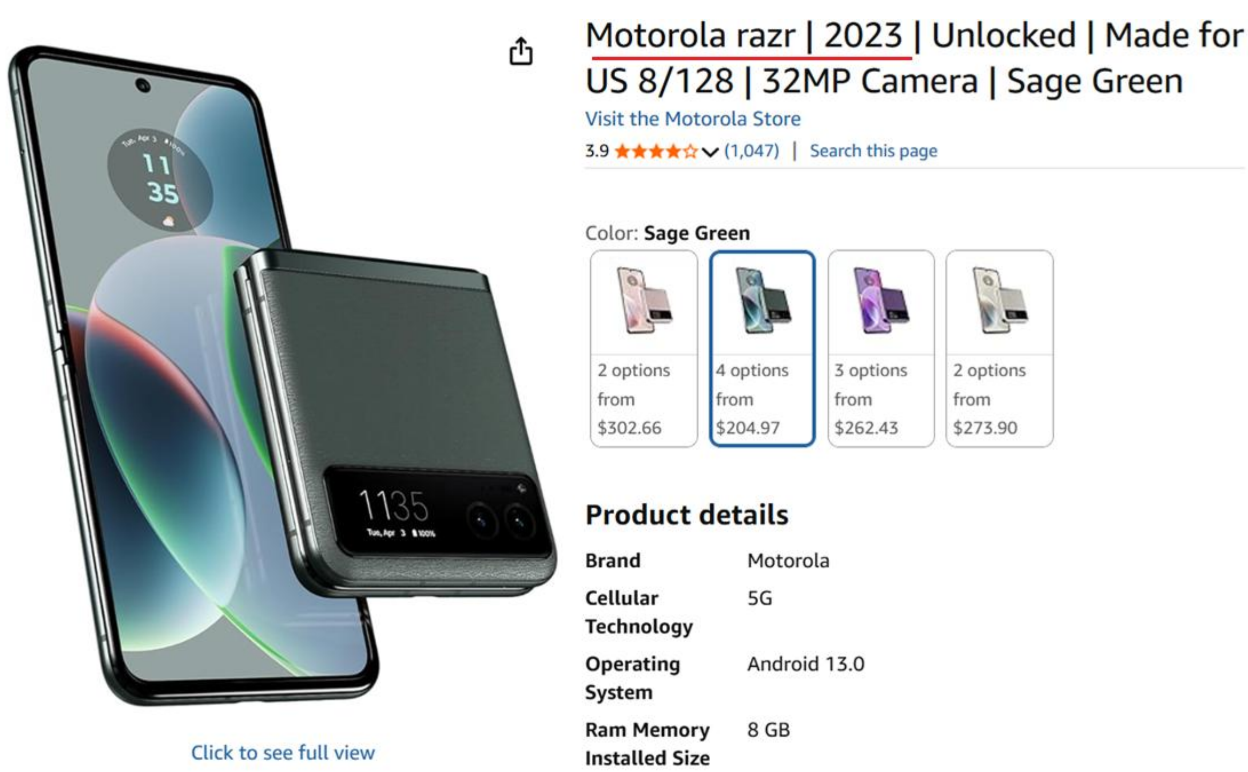
An AP that transmits a PPDU may solicit an HE TB PPDU from one or more non-AP STAs through one of the following mechanisms:

- Including in the PPDU one or more Trigger frames that include one or more User Info fields with one of the following AID12 subfield settings:
  - The AID12 subfield is set to the 12 LSBs of the AID of the non-AP STA if the User Info field is addressed to a STA that is associated with the AP.
  - The AID12 subfield is set to the 12 LSBs of the AID of the non-AP STA if the User Info field is addressed to a STA that is associated with an AP corresponding to a nontransmitted BSSID in a multiple BSSID set to which the AP belongs, the TA field of the Trigger frame is set to the transmitted BSSID, and the non-AP STA has set the Rx Control Frame To MultiBSS subfield in the HE Capabilities element it transmits to 1.
  - The AID12 subfield indicates that one or more contiguous RA-RUs are allocated (see 26.5.4).
- Including in the PPDU one or more individually addressed frames that include a TRS Control subfield and that are carried in one of the following:
  - An S-MPDU that solicits an immediate Ack frame (see 10.12.8).
  - An A-MPDU that solicits an immediate BlockAck frame (see 10.25.6.7).
  - A multi-TID A-MPDU that solicits an immediate Multi-STA BlockAck frame (see 26.6.3).

The AP shall follow the rules in 26.3.2 if any MPDUs are fragments.

(*E.g.*, IEEE 802.11ax standard).

16. The Accused Instrumentality practices generating a control signal to the power amplifier (*e.g.,* control signal PAEN, *i.e.*, PA Enable, to switch on the power amplifier/PA via SPDT as illustrated by the diagrams for QXM108x) according to the information. As shown below, the Accused Instrumentality supports Wi-Fi 6 connectivity by utilizing a Front-End Module from Qualcomm QXM108X. This Wi-Fi 6 Front End module comprises antenna modules which connect with power amplifiers for uplink transmission. The power amplifiers can be enabled with a control signal PAEN, *e.g.,* PA Enable. When the Accused Instrumentality transmits data, power amplifier is enabled for transmitting uplink data.



(*E.g.*, https://www.amazon.com/Motorola-Unlocked-Camera-170-82-7-35mm/dp/B0CGVXZSQJ?th=1).

(*E.g.*, https://en-us.support.motorola.com/app/answers/detail/a_id/176643/~/specifications---motorola-razr---2023).

Connectivity

Networks + Bands
5G | 4G: LTE (Cat18) | 3G: UMTS / HSPA+ | 2G: GSM / EDGE
3G: GSM QB; W1/2/4/5/8
4G: B1/2/3/4/5//7/8/12/13/14/18/20/25/26/28/29/30/38/39/40/41/46/48/66/71
5G7 sub-6: N1/2/3/5/7/12/14/20/25/26/28/29/30/41/48/66/71/77/78

Bluetooth Technology - Bluetooth® 5.3

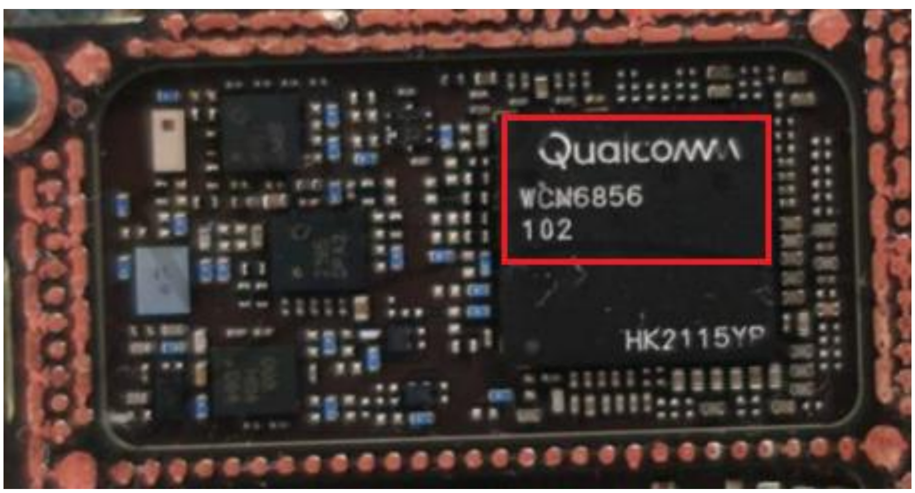
NFC - Yes

Wi-Fi - 802.11 a/b/g/n/ac/ax/Wi-Fi 6e 2.4GHz & 5GHz & 6GHz Wi-Fi hotspot

Location Services - GPS, A-GPS, LTEPP, SUPL, GLONASS, Galileo

SIM Card - eSIM + physical SIM

(*E.g.*, https://en-us.support.motorola.com/app/answers/detail/a_id/176643/~/specifications---motorola-razr---2023).



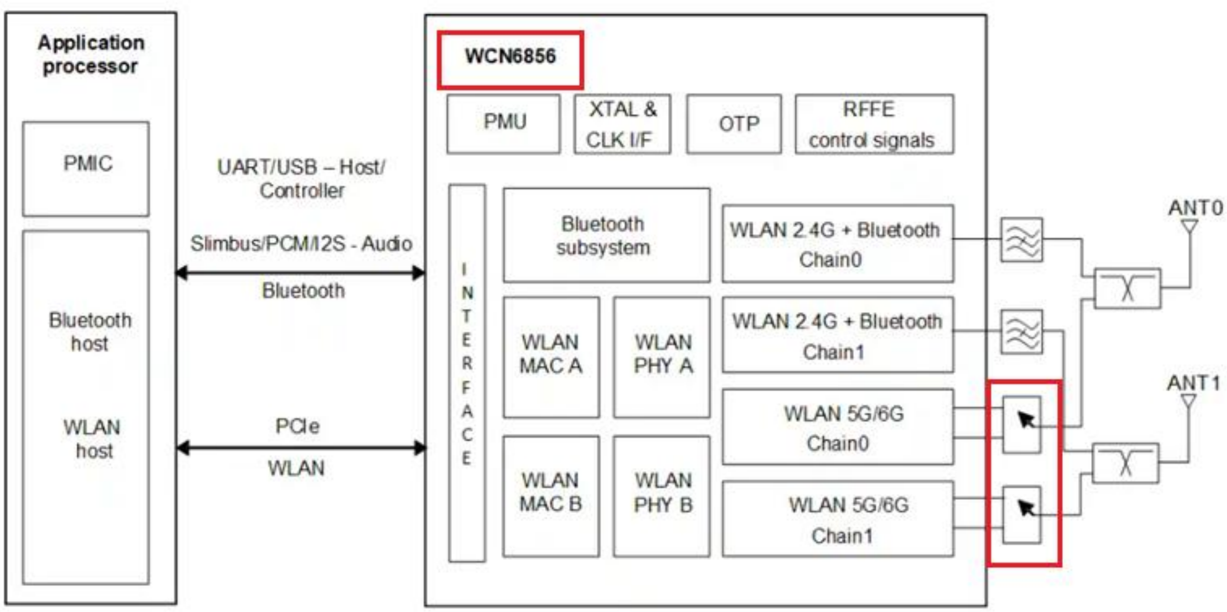
(*E.g.*, *Teardown of the Accused Instrumentality*).

Device description

The WCN6856 device is a highly integrated system-on-chip (SoC) that supports 802.11ax Wi-Fi and Bluetooth® 5.3. The WCN6856 supports simultaneous operation on 2.4 GHz and 5 GHz or 6 GHz, also known as Dual Band Simultaneous (DBS).

For the complete features and system specifications, see WCN6856 Tri-Band 2x2 MIMO DBS 802.11ax + Bluetooth 5.3 Data Sheet (80-WL542-1).

(*E.g.*, https://docs.qualcomm.com/doc/80-WL542-10/topic/overview.html).



(*E.g.*, https://docs.qualcomm.com/doc/80-WL542-10/topic/overview.html).

Part Numbers

Product	Part Number
FastConnect 6900 supports low power PCIe interface and UART interface for Bluetooth	WCN685x-1
FastConnect 6900 supports low power PCIe interface and USB 1.1 for Bluetooth	WCN685x-5

(*E.g.*, https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/qualcomm-fastconnect-6900-product-brief_finalv7.pdf).

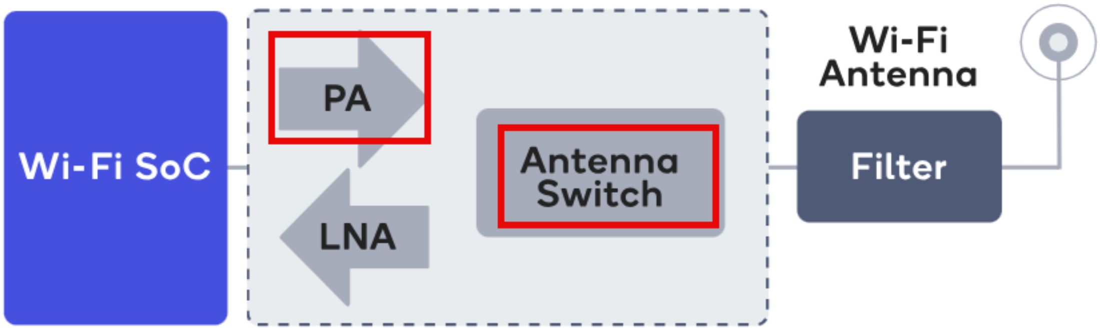
Fully Integrated front end module designed for Wi-Fi

Our Qualcomm® QXM108x Wi-Fi Front End Modules (FEMs) are comprised of small size RFFEs with integrated active and passive components used to cover the wide breadth of IEEEE802.11b/g/ac/ax/be applications. Our latest offering includes integrated power amplifiers, low noise amplifiers, switches, and directional couplers. The latest Wi-Fi air interface standards are supported, including Wi-Fi 6, Wi-Fi 6E and Wi-Fi 7.

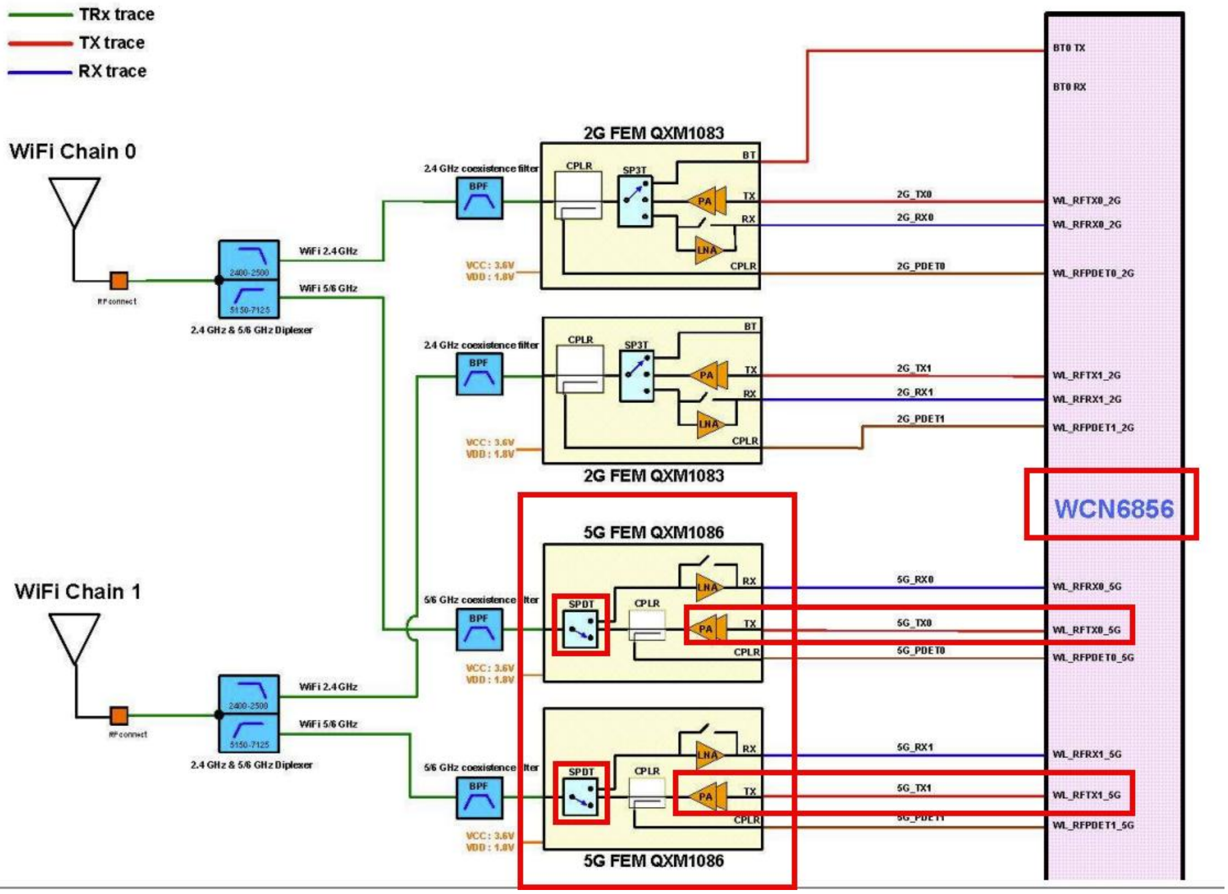
Paired with the latest Qualcomm® FastConnect 6900 and Qualcomm® FastConnect 7800 Wi-Fi solutions, our Qualcomm® QXM108x Wi-Fi Front End Modules deliver a comprehensive modem-to-antenna system for flexible, cost-effective, high-performance Wi-Fi connected experiences.

This product line enables OEMs to quickly develop and launch powerful Wi-Fi solutions at scale with 5G NR and Bluetooth concurrency while attaching to the broad applications of Snapdragon® Mobile, Computing and AR/VR Platforms.

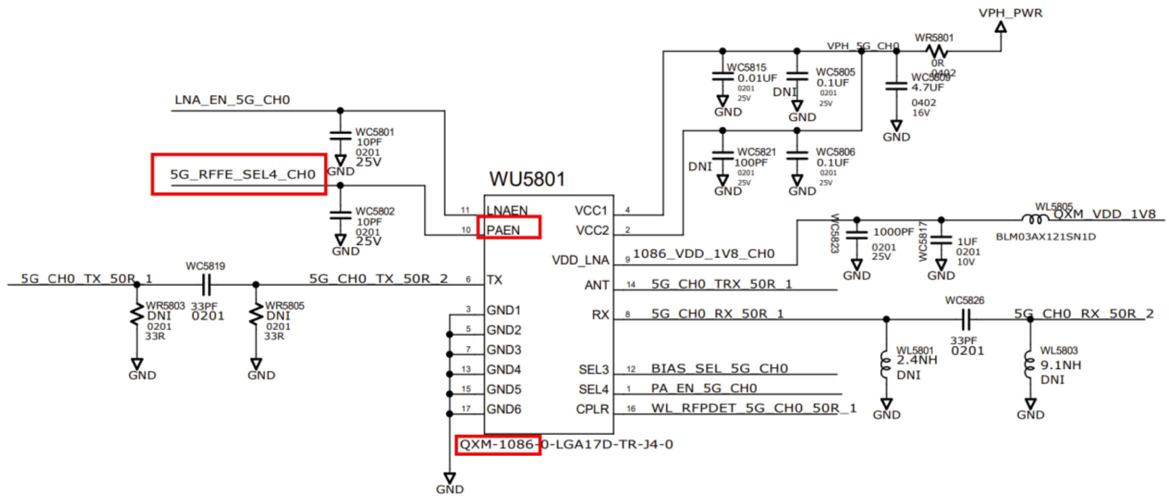
(*E.g.*, https://www.qualcomm.com/modems/rf/products/qxm108x).



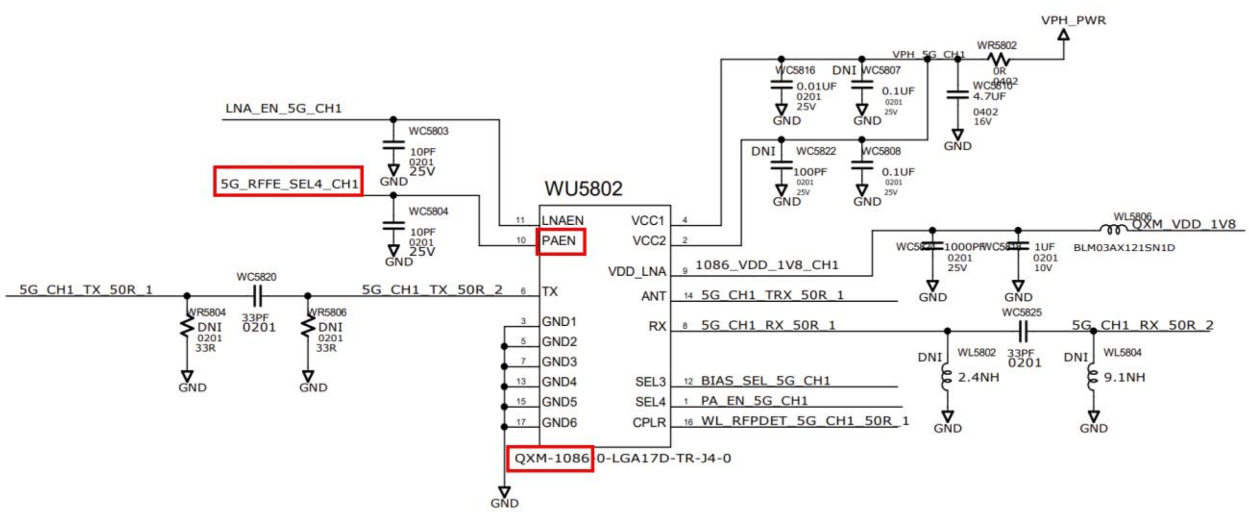
(*E.g.*, https://www.qualcomm.com/modems/rf/products/qxm108x).



(*E.g.*, https://fcc.report/FCC-ID/UZ7WT0/7289507.pdf).



(*E.g.*, https://fcc.report/FCC-ID/UZ7WT0/7289507.pdf).



(*E.g.*, https://fcc.report/FCC-ID/UZ7WT0/7289507.pdf).

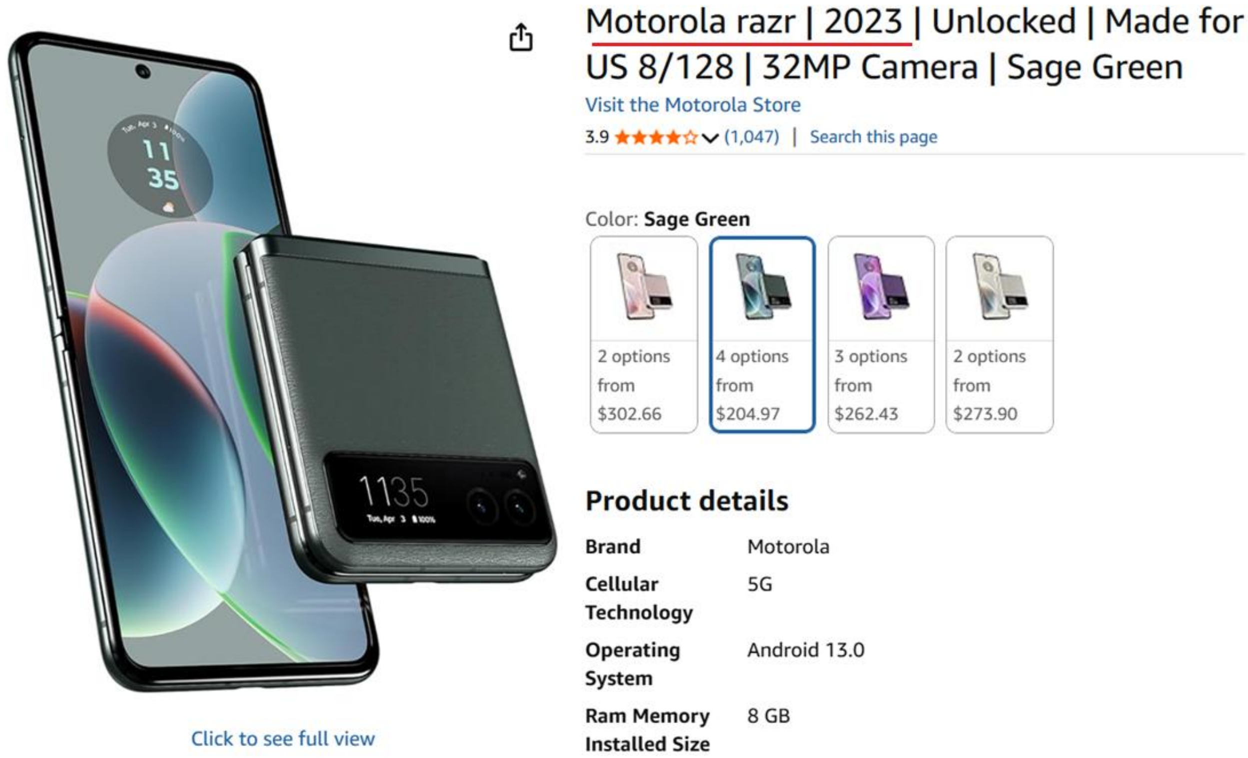
Features

- Small-size PA/LNA RFFEs for IEEE802.11a/n/ac/ax/be applications
- Covers 2.4GHz, 5GHz and 6GHz frequency ranges
- Supports Wi-Fi 7
- Integrated power amplifier (PA) supporting several high linearity and high-efficiency modes
- Integrated low noise amplifier supporting high gain, high efficiency, and bypass modes
- Integrated switches for single antenna Wi-Fi Rx and Wi-Fi Tx operation
- Integrated directional coupler for precise transmit power control
- Optimized for use with Qualcomm® WCN685x and Qualcomm® WCN785x
- 50 Ω RF ports, no external RF matching components required
- Low profile, small-size laminate package
- Integrated ESD protection on all pins
- Ni/Au-plated pads
- RoHS compliant
- Moisture sensitivity level 3 (MSL3)

(*E.g.*, https://www.qualcomm.com/modems/rf/products/qxm108x).

17. The Accused Instrumentality practices such that the control signal (*e.g.,* control signal for enabling power amplifier) indicates switching on the power amplifier (*e.g.,* power amplifier) during a first time interval (*e.g.*, fragment MPDU transmitting interval) of a data frame (*e.g.,* Aggregate MPDUs, A-MPDU, MSDU, or MMPDU) and switching off the power amplifier (*e.g.,* power amplifier) during a second time interval (*e.g.,* immediate response or Ack period after each fragment is transmitted) of the data frame (*e.g.,* Aggregate MPDUs, A-MPDU, MSDU, or MMPDU), wherein during the second time interval (*e.g.,* immediate response or Ack period after each fragment is transmitted) of the data frame (*e.g.,* Aggregate MPDUs, A-MPDU, MSDU, or

MMPDU), there is no up-link message to be transmitted (*e.g.,* the Accused Instrumentality receives Ack message from access point in downlink transmission). As shown below, the Accused Instrumentality supports Wi-Fi 6 connectivity by utilizing a Front-End Module. This Wi-Fi 6 Front End module comprises an antenna module which connects with a power amplifier. The power amplifier can be enabled with a control signal. When the Accused Instrumentality transmits data then power amplifier is enabled for transmitting uplink data. The Accused Instrumentality follows Wi-Fi 6 or IEEE 802.11ax standard. The standard discloses that a non-AP HE STA (*e.g., the* Accused Instrumentality) receives a trigger frame (*e.g.,* bit stream) from an access point. The non-AP HE STA gets transmission opportunity on receiving the trigger frame. The standard also discloses that the non-AP HE STA can transmit fragmented MPDUs which would be part of an aggregated MPDU, A-MPDU, MSDU or MMPDU. It turns on power amplifier (*e.g.,* TX PA) during transmission of fragmented MPDUs (*e.g.,* first interval of data frame) and switches off TX PA during the immediate response or Ack period after each fragment is transmitted (*e.g.,* second interval of data frame), in order to allow the RX amplifier (*e.g.,* LNA) to be turned on to receive the immediate response or Ack.



(*E.g.*, https://www.amazon.com/Motorola-Unlocked-Camera-170-82-7-35mm/dp/B0CGVXZSQJ?th=1).

Specifications - motorola razr (2023)

Performance

Operating system - Android 13

Internal storage - 128GB built-in UFS 2.2

Sensors - Fingerprint reader, Proximity sensor, Ambient light sensor, Ultra-Sonic sensor, Accelerometer + Gyroscope, eCompass, Hall sensor, Barometer

Processor - Snapdragon 7 Gen 1 Mobile Platform

Memory (RAM) - 8GB LPDDR4X

Security - Side fingerprint reader, Face unlock

(*E.g.*, https://en-us.support.motorola.com/app/answers/detail/a_id/176643/~/specifications---motorola-razr---2023).

Connectivity

Networks + Bands
5G | 4G: LTE (Cat18) | 3G: UMTS / HSPA+ | 2G: GSM / EDGE
3G: GSM QB; W1/2/4/5/8
4G: B1/2/3/4/5//7/8/12/13/14/18/20/25/26/28/29/30/38/39/40/41/46/48/66/71
5G7 sub-6: N1/2/3/5/7/12/14/20/25/26/28/29/30/41/48/66/71/77/78

Bluetooth Technology - Bluetooth® 5.3

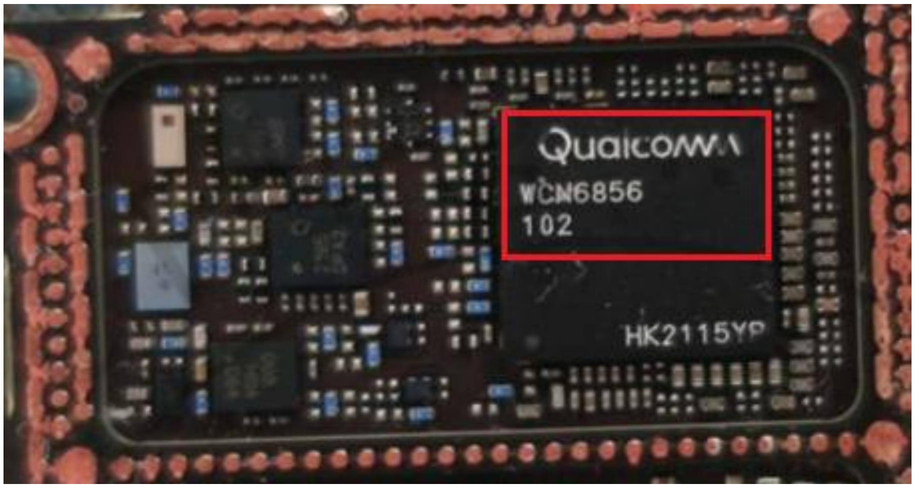
NFC - Yes

Wi-Fi - 802.11 a/b/g/n/ac/ax/Wi-Fi 6e 2.4GHz & 5GHz & 6GHz Wi-Fi hotspot

Location Services - GPS, A-GPS, LTEPP, SUPL, GLONASS, Galileo

SIM Card - eSIM + physical SIM

(*E.g.*, https://en-us.support.motorola.com/app/answers/detail/a_id/176643/~/specifications---motorola-razr---2023).



(*E.g.*, *Teardown of the Accused Instrumentality*).

Device description

The WCN6856 device is a highly integrated system-on-chip (SoC) that supports 802.11ax Wi-Fi and Bluetooth® 5.3. The WCN6856 supports simultaneous operation on 2.4 GHz and 5 GHz or 6 GHz, also known as Dual Band Simultaneous (DBS).

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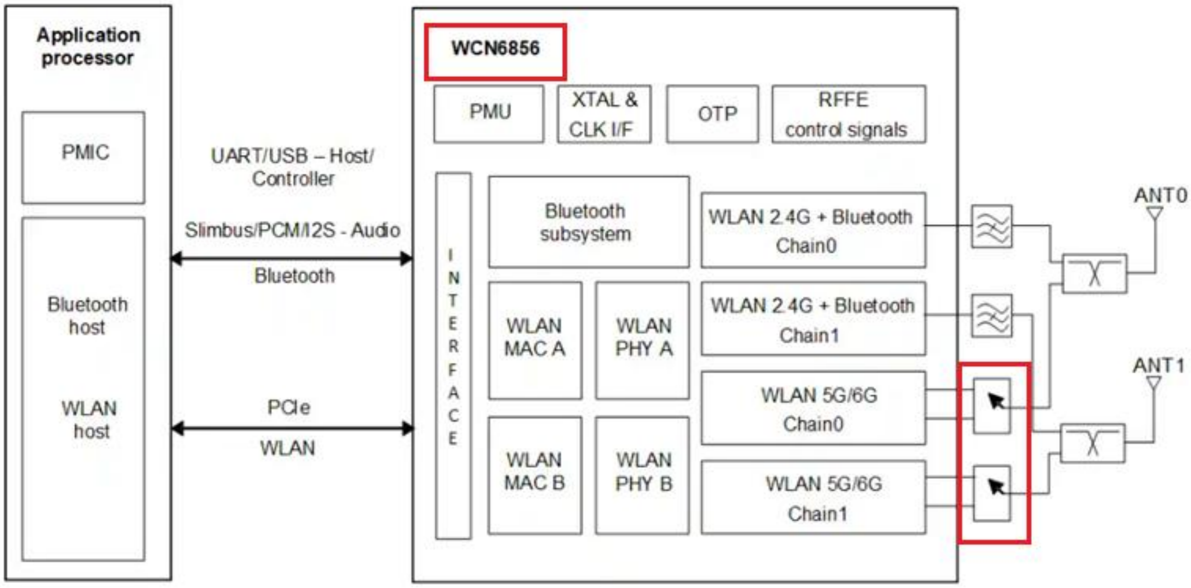
(*E.g.*, https://docs.qualcomm.com/doc/80-WL542-10/topic/overview.html).



(*E.g.*, https://docs.qualcomm.com/doc/80-WL542-10/topic/overview.html).

Part Numbers

Product	Part Number
FastConnect 6900	WCN685x-1
supports low power PCIe interface and UART interface for Bluetooth	
FastConnect 6900	WCN685x-5
supports low power PCIe interface and USB 1.1 for Bluetooth	

(*E.g.*, https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/qualcomm-fastconnect-6900-product-brief_finalv7.pdf).

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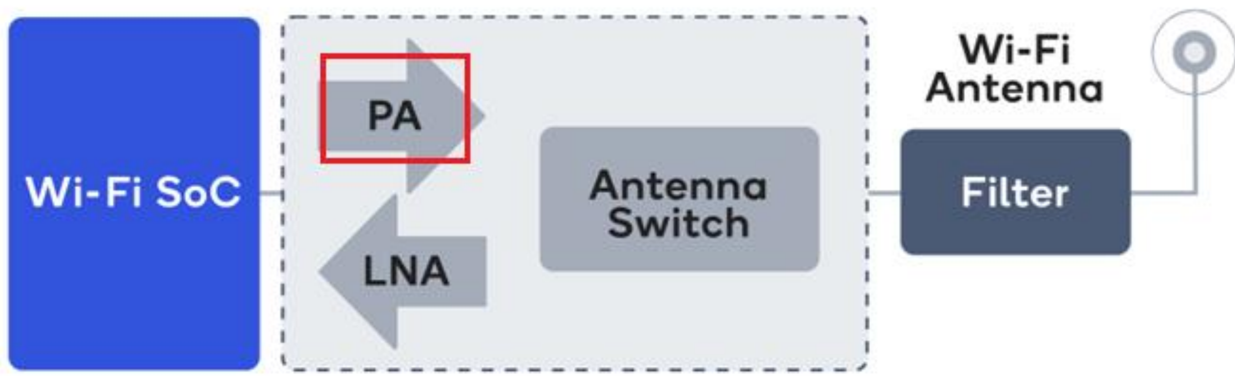
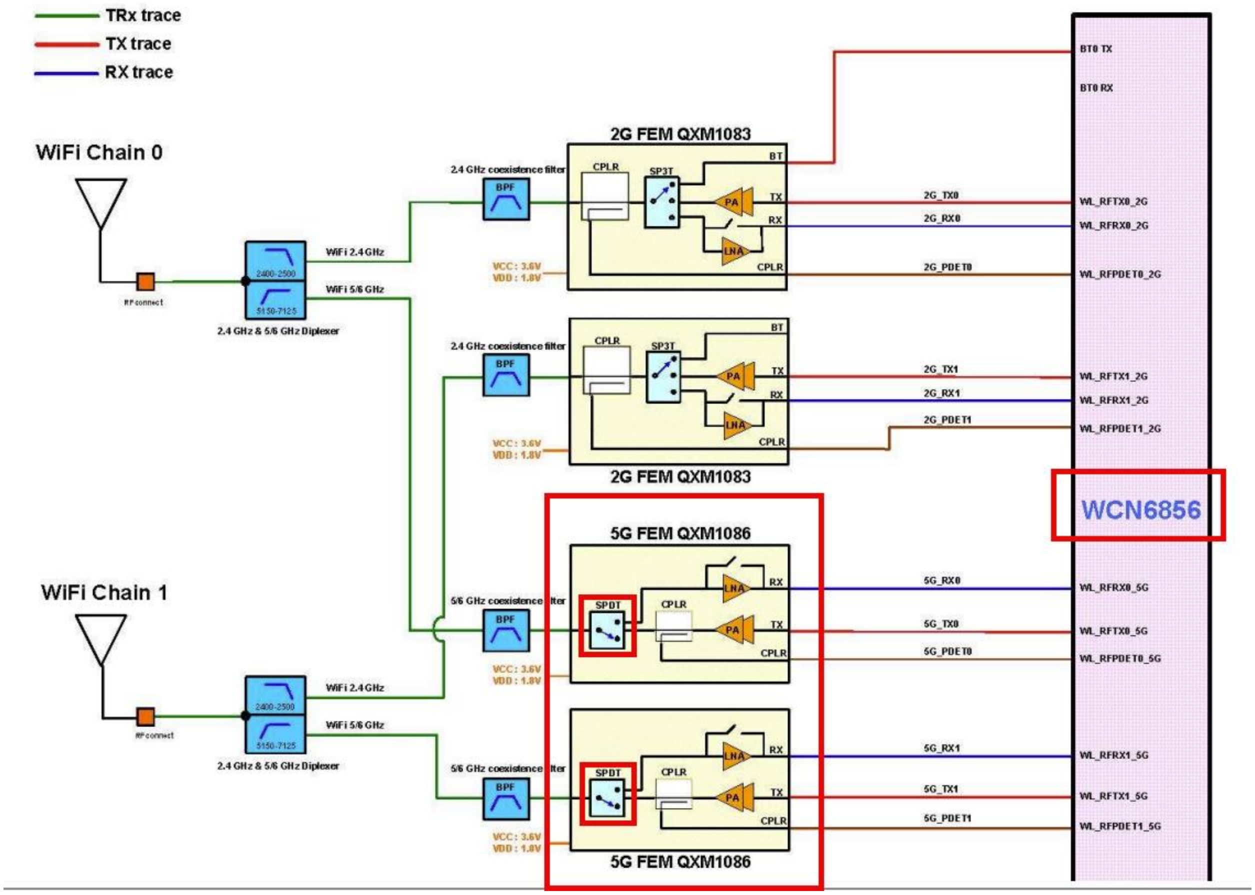
This product line enables OEMs to quickly develop and launch powerful Wi-Fi solutions at scale with 5G NR and Bluetooth concurrency while attaching to the broad applications of Snapdragon® Mobile, Computing and AR/VR Platforms.

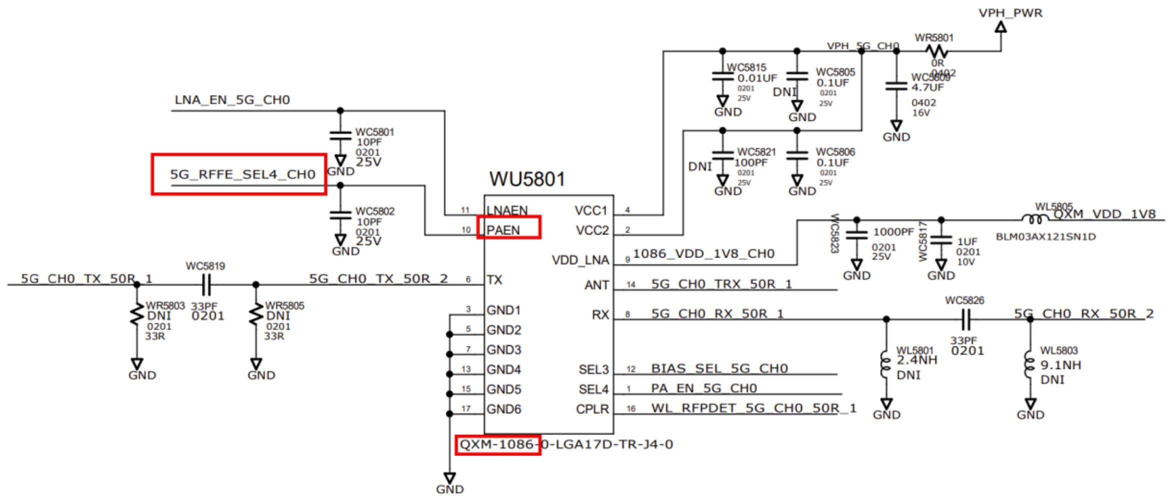
(*E.g.*, https://www.qualcomm.com/modems/rf/products/qxm108x).



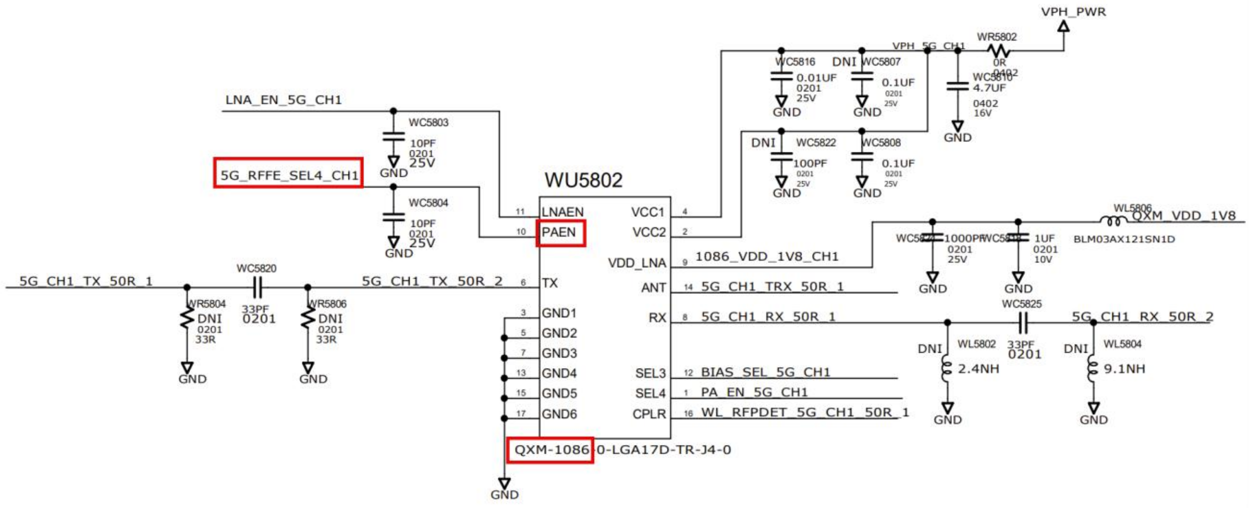
(*E.g.*, https://www.qualcomm.com/modems/rf/products/qxm108x).



(*E.g.*, https://fcc.report/FCC-ID/UZ7WT0/7289507.pdf).



(*E.g.*, https://fcc.report/FCC-ID/UZ7WT0/7289507.pdf).



(*E.g.*, https://fcc.report/FCC-ID/UZ7WT0/7289507.pdf).

Features

- Small-size PA/LNA RFFEs for IEEE802.11a/n/ac/ax/be applications
- Covers 2.4GHz, 5GHz and 6GHz frequency ranges
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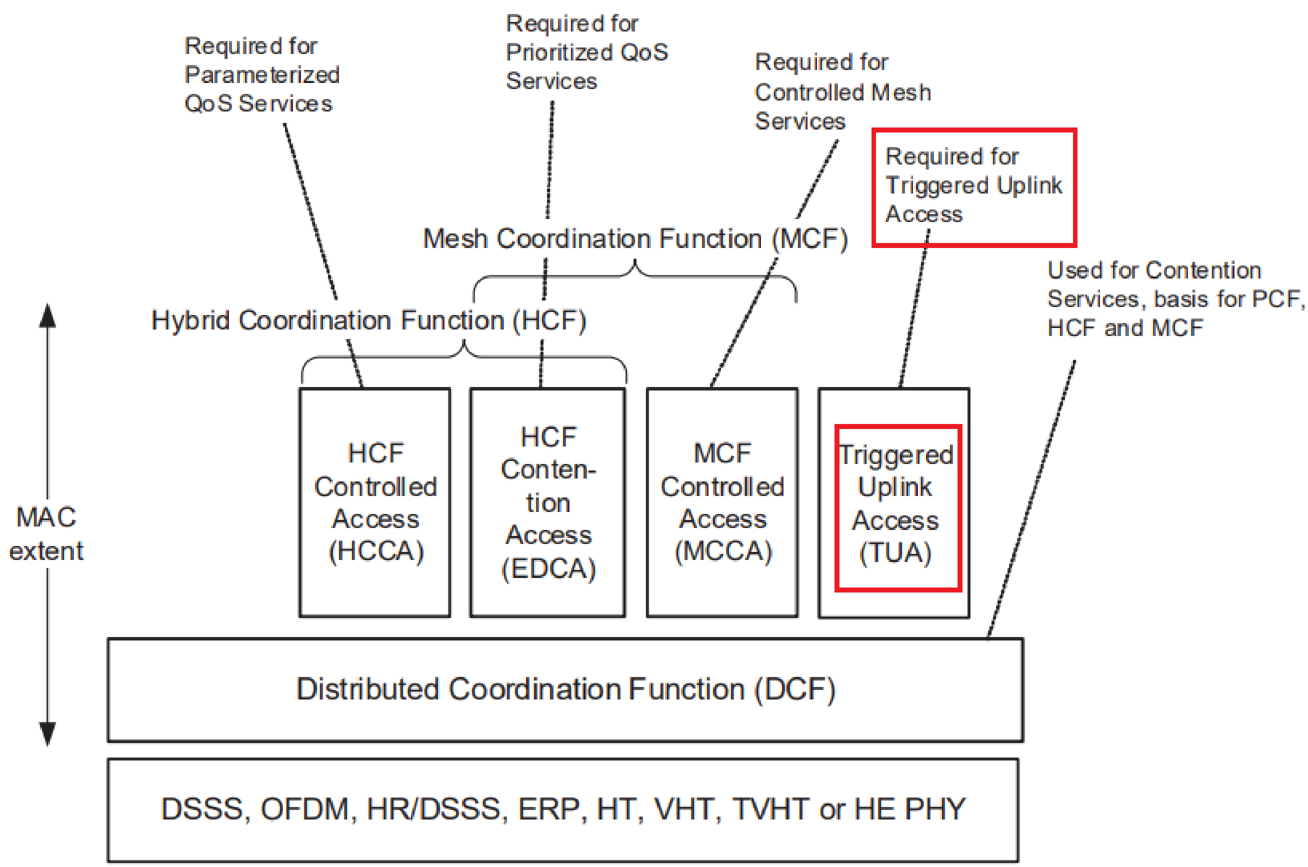
- Integrated directional coupler for precise transmit power control
- Optimized for use with Qualcomm® WCN685x and Qualcomm® WCN785x
- 50 Ω RF ports, no external RF matching components required
- Low profile, small-size laminate package
- Integrated ESD protection on all pins
- Ni/Au-plated pads
- RoHS compliant
- Moisture sensitivity level 3 (MSL3)

(*E.g.*, https://fcc.report/FCC-ID/UZ7WT0/7289507.pdf).

The MAC functional description is presented in this clause. The architecture of the MAC sublayer, including the distributed coordination function (DCF), the hybrid coordination function (HCF), the mesh coordination function (MCF), the triggered UL access (TUA), and their coexistence in an IEEE 802.11 LAN are introduced in 10.2. These functions are expanded on in 10.3, 10.23, ~~and~~ 10.24, and 26.2. Fragmentation and defragmentation are defined in 10.4 and 10.5. Multirate support is addressed in 10.6. A number of additional restrictions to limit the cases in which MSDUs are reordered or discarded are described in 10.7. Operation across regulatory domains is defined in 10.22. The block ack mechanism is described in 10.25. The No Ack mechanism is described in 10.26. The protection mechanism is described in 10.27. Rules for processing MAC frames are described in 10.28.

(*E.g.*, IEEE 802.11ax standard).



(*E.g.*, IEEE 802.11ax standard).

triggered uplink access (TUA): A mechanism by which one or more non-access-point (non-AP) stations (STAs) simultaneously participate in an uplink (UL) transmission to an access point (AP) using resource units (RUs) allocated in the preceding Trigger frame.

triggering frame: A Trigger frame or a frame carrying a TRS Control subfield.

(*E.g.*, IEEE 802.11ax standard).

The main PHY features in an HE STA that are not present in VHT STA or HT STA are the following:

- Mandatory support for DL and UL OFDMA
- Mandatory support for DL MU-MIMO by an HE AP that supports 4 or more spatial streams when MU-MIMO is done on the entire PPDU bandwidth
- Mandatory support for DL MU-MIMO reception for a non-AP HE STA
- Mandatory support for the HE sounding protocol to support beamforming for a non-AP STA beamformee and optional otherwise
- Optional support for HE-MCSs 10 and 11
- Optional support for UL MU-MIMO
- Optional support for preamble puncturing

(*E.g.*, IEEE 802.11ax standard).

An HE AP sends a Trigger frame to initiate UL MU operation using UL OFDMA or UL MU-MIMO transmissions or a frame containing a TRS Control subfield to initiate UL OFDMA transmissions. The frame initiating these transmissions in the uplink direction is a triggering frame. The triggering frame identifies non-AP STAs participating in UL MU operation and assigns RUs and/or spatial streams to these STAs. Multi-STA BlockAck frames can be used by the AP to acknowledge the frames transmitted by multiple non-AP STAs. The scheduling of these Trigger frames can be set up between a non-AP STA and the AP using TWT operation to save power and reduce collisions.

(*E.g.*, IEEE 802.11ax standard).

9.3.1.22 Trigger frame format

9.3.1.22.1 General

A Trigger frame allocates resources for and solicits one or more HE TB PPDU transmissions. The Trigger frame also carries other information required by the responding STA to send an HE TB PPDU.

(*E.g.*, IEEE 802.11ax standard).

The format for the Trigger frame is defined in Figure 9-64a.

	MAC header							
	Frame Control	Duration	RA	TA	Common Info	User Info List	Padding	FCS
Octets:	2	2	6	6	8 or more	variable	variable	4

Figure 9-64a—Trigger frame format

The Duration field is set as defined in 9.2.5.

(*E.g., IEEE 802.11ax standard*).

7) In a Basic Trigger frame, the Duration/ID field is set to the estimated time required to transmit the solicited HE TB PPDU, plus the estimated time required to transmit the acknowledgment for the solicited HE TB PPDU if required, plus applicable SIFSs.

Multiple protection settings. The Duration/ID field is set to a value D as follows:

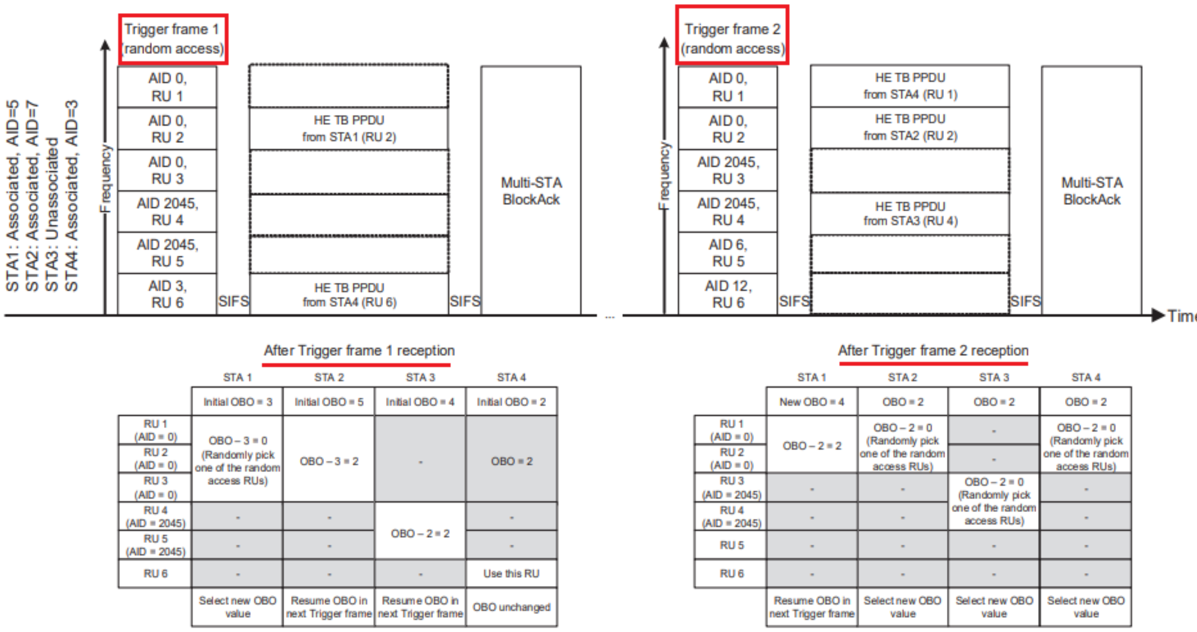
...

4) Else $T_{END-NAV} - T_{PPDU} \leq D \leq T_{TXOP-REMAINING} - T_{PPDU}$

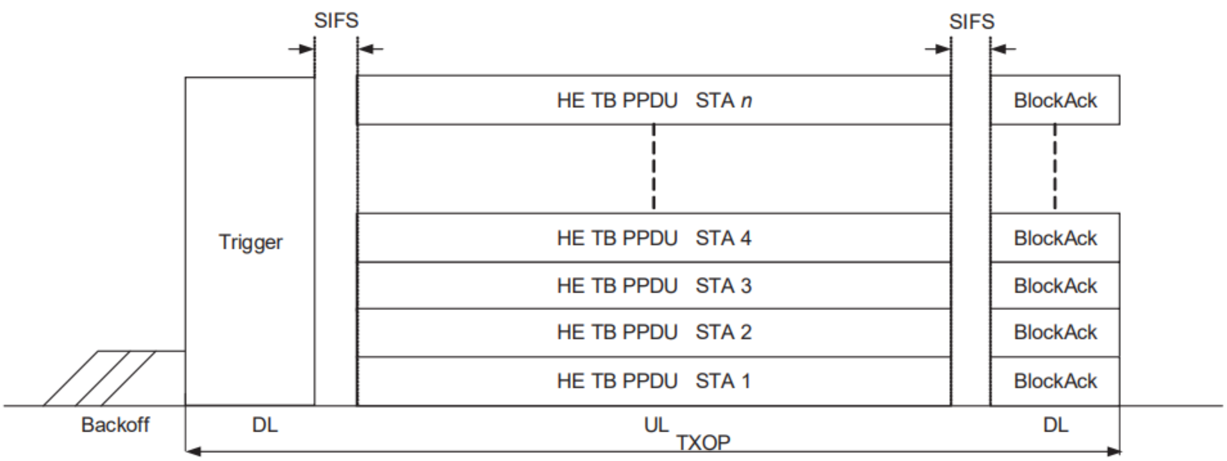
where

$T_{SINGLE\text{-}MSDU}$	is the estimated time required for the transmission of the allowed frame exchange sequence defined in 10.23.2.9 (for a TXOP limit of 0), including applicable IFS durations
$T_{PENDING}$	is the estimated time required for the transmission of — Pending MPDUs ~~of the same AC~~ — Any associated immediate response frames — Any HT NDP, VHT NDP, HE sounding NDP, or Beamforming Report Poll frame transmissions and explicit feedback response frames — Applicable IFSs — Any RDG — Any BDT — Any pending QoS Null frame exchanges by paged STAs — Any pending PS-Poll or NDP PS-Poll frame exchanges by paged STAs
T_{TXOP}	is the duration given by dot11EDCATableTXOPLimit (dot11QAPEDCATableTXOPLimit for the AP) for that AC
$T_{TXOP\text{-}REMAINING}$	is T_{TXOP} less the time already used time within the TXOP
$T_{END\text{-}NAV}$	is the remaining duration of any NAV set by the TXOP holder, or 0 if no NAV has been established
T_{PPDU}	is the time required for transmission of the current PPDU

(*E.g.*, IEEE 802.11ax standard).



(*E.g.*, IEEE 802.11ax standard).



(*E.g.*, IEEE 802.11ax standard).

27.3.4 HE PPDU formats

Four HE PPDU formats are defined: HE SU PPDU, HE MU PPDU, HE ER SU PPDU, and HE TB PPDU. The HE sounding NDP is a variant of the HE SU PPDU and defined in 27.3.17. The HE TB feedback NDP is a variant of the HE TB PPDU and defined in 27.3.18.

NOTE—The HE ER SU PPDU is not a variant of the HE SU PPDU. Requirements related to HE SU PPDUs and HE ER SU PPDUs are specified separately.

The format of the HE SU PPDU is defined as in Figure 27-8. This PPDU format is used for SU transmission, and in this format, the HE-SIG-A field is not repeated.

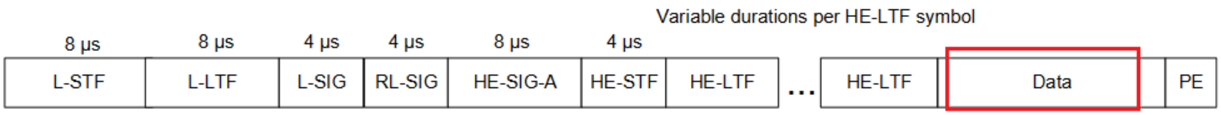


Figure 27-8—HE SU PPDU format

(*E.g.*, IEEE 802.11ax standard).

fragmentation: The process of partitioning a medium access control (MAC) service data unit (MSDU), aggregate MAC service data unit (A-MSDU) or MAC management protocol data unit (MMPDU) into a sequence of smaller MAC protocol data units (MPDUs) prior to transmission. The process of recombining a set of fragment MPDUs into an MSDU, A-MSDU, or MMPDU is known as defragmentation. These processes are described in 5.8.1.9 of ISO/IEC 7498-1:1994.

(*E.g.*, IEEE 802.11ax standard).

An AP that transmits a PPDU may solicit an HE TB PPDU from one or more non-AP STAs through one of the following mechanisms:

- Including in the PPDU one or more Trigger frames that include one or more User Info fields with one of the following AID12 subfield settings:
  - The AID12 subfield is set to the 12 LSBs of the AID of the non-AP STA if the User Info field is addressed to a STA that is associated with the AP.
  - The AID12 subfield is set to the 12 LSBs of the AID of the non-AP STA if the User Info field is addressed to a STA that is associated with an AP corresponding to a nontransmitted BSSID in a multiple BSSID set to which the AP belongs, the TA field of the Trigger frame is set to the transmitted BSSID, and the non-AP STA has set the Rx Control Frame To MultiBSS subfield in the HE Capabilities element it transmits to 1.
  - The AID12 subfield indicates that one or more contiguous RA-RUs are allocated (see 26.5.4).
- Including in the PPDU one or more individually addressed frames that include a TRS Control subfield and that are carried in one of the following:
  - An S-MPDU that solicits an immediate Ack frame (see 10.12.8).
  - An A-MPDU that solicits an immediate BlockAck frame (see 10.25.6.7).
  - A multi-TID A-MPDU that solicits an immediate Multi-STA BlockAck frame (see 26.6.3).

The AP shall follow the rules in 26.3.2 if any MPDUs are fragments.

(*E.g.*, IEEE 802.11ax standard).

26.3.2 Dynamic fragmentation

26.3.2.1 General

With level 1 and level 2 dynamic fragmentation, the following apply:

- An originator STA transmitting one or more dynamic fragments shall solicit an immediate response from the recipient STA for each of the fragments.
- The originator STA shall transmit the fragments in order as defined in 10.4.

(*E.g.*, IEEE 802.11ax standard).

9.7 Aggregate MPDU (A-MPDU)

9.7.1 A-MPDU format

An A-MPDU consists of a sequence of one or more A-MPDU subframes and a variable amount of EOF padding as shown in Figure 9-971.

A-MPDU pre-EOF padding

	A-MPDU subframe 1	A-MPDU subframe 2	...	A-MPDU subframe n	EOF Padding
Octets:	variable	variable		variable	variable

Figure 9-971—A-MPDU format

(*E.g.*, IEEE 802.11ax standard).

	MPDU delimiter	MPDU	Padding
Octets:	4	variable	0–3

Figure 9-973—A-MPDU subframe format

(*E.g.*, IEEE 802.11ax standard).

10.3.4.5 Control of the channel

The SIFS is used to provide an efficient MSDU delivery mechanism. Once the STA has contended for the channel, that STA shall continue to send fragments until either all fragments of a single MSDU or MMPDU have been sent or an acknowledgment is not received. Should the sending of the fragments be interrupted due to one of these reasons, when the next opportunity for transmission occurs the STA shall resume transmission. The algorithm by which the STA decides which of the outstanding MSDUs shall next be attempted after an unsuccessful transmission (as defined in 10.3.4.3) attempt is beyond the scope of this standard, but any such algorithm shall comply with the restrictions listed in 10.7.

Figure 10-20 illustrates the transmission of a fragmented MSDU using the SIFS.

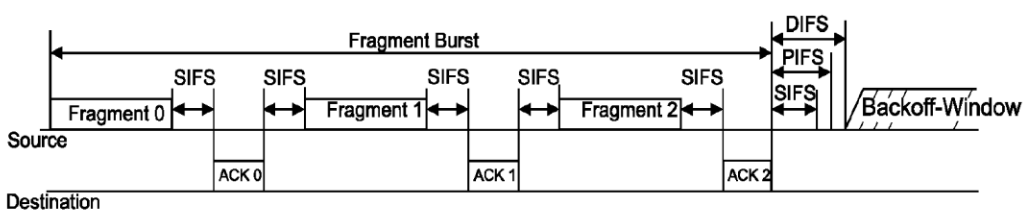


Figure 10-20—Transmission of a fragmented MSDU using SIFS

(*E.g.*, IEEE 802.11-2020 standard).

18. **Indirect Infringement**. Upon information and belief, Defendant has been and now is indirectly infringing by way of inducing infringement and contributing to the infringement of claim 11 of the '575 Patent in the State of Illinois, in this District, and elsewhere in the United States, by providing the Accused Instrumentality for use as described above by Defendant's customers. Defendant advertised, offered for sale, and/or sold the Accused Instrumentality to its customers for use in a manner that Defendant knew infringed claim 11 of the '575 Patent. For example, Defendant provided marketing material that the Accused Instrumentality performs the claimed method for handling a transmitting process of a communication apparatus in a communication system as claimed in claim 11 of the '575 Patent. (*Supra* ¶¶14-17 (identifying marketing materials)).

19. On information and belief, since Defendant became aware of the '575 Patent and the infringement at least as of the date of the service of the Original Complaint, Defendant is and has been committing the act of inducing infringement by specifically intending to induce infringement by providing the Accused Instrumentality to its customers and by aiding and abetting its use as demonstrated by the marketing materials in a manner known to infringe by Defendant. Since becoming aware of the infringing use of the Accused Instrumentality, Defendant knew that the use of the Accused Instrumentality by its customers as instructed constituted direct patent infringement. Despite this knowledge, Defendant continued to encourage and induce its customers to use the Accused Instrumentality to infringe as described above and provided instructions for using the Accused Instrumentality to infringe, including through instructional materials, support, and user's guides. Exemplary materials are cited above. (*Supra* ¶¶14-17 (identifying marketing materials)). Defendant therefore knowingly induced infringement and specifically intended to encourage and induce the infringement of the '575 Patent by its customers.

20. On information and belief, since Defendant became aware of the infringement at least as of the date of the service of the Original Complaint, Defendant is and has been committing the act of contributory infringement by intending to provide the identified Accused Instrumentality to its customers knowing that it is a material part of the invention, knowing that its use was made and adapted for infringement of the '575 Patent, and further knowing that the accused use of the Accused Instrumentality is not a staple article or commodity of commerce suitable for substantially non-infringing use. As described above, Defendant was aware that all material claim limitations are satisfied by the use and implementation of the Accused Instrumentality by Defendant's customers in the manner described above yet continued to provide the Accused Instrumentality to its customers knowing that it is a material part of the invention. (*Supra* ¶¶14-17 (identifying marketing materials)). As described above, since learning of the infringement, Defendant knew that the use and implementation of the Accused Instrumentality by its customers was made and adapted for infringement of the '575 Patent. (*Id.*). A new act of direct infringement occurred each time a customer implemented and/or used the Accused Instrumentality in the manner described above. After Defendant became aware that the use of the Accused Instrumentality infringes claim 11 of the '575 Patent, Defendant knew that each such new use was made and adapted for infringement of claim 11 of the '575 Patent and Defendant continued to advertise and provide the Accused Instrumentality for such infringing activities. (*Supra* ¶¶14-17 (identifying marketing materials)). Furthermore, as described more fully above, the Accused Instrumentality has functionality designed to perform the steps in the manner described above and is therefore not a staple article or commodity of commerce suitable for substantially non-infringing use. (*Id.*).

21. Plaintiff has been damaged as a result of Defendant's infringing conduct. Defendant is thus liable to Plaintiff for damages in an amount that adequately compensates

Plaintiff for such Defendant's infringement of the '177 Patent, *i.e.*, in an amount that by law cannot be less than would constitute a reasonable royalty for the use of the patented technology, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

22. Unless a preliminary and permanent injunction are issued enjoining Defendant and all others acting in active concert therewith from infringing the '575 Patent, Plaintiff will be greatly and irreparably harmed.

23. Plaintiff is only asserting a method claim in the '575 Patent and as such the marking requirements of 35 U.S.C. 287(a) do not apply. *Crown Packaging Technology, Inc. v. Rexam, Beverage Can Co.*, 559 F.3d 1308, 1316-1317 (Fed. Cir. 2009) ("Because Rexam asserted only the method claims of the '839 patent, the marking requirement of 35 U.S.C. 287(a) does not apply."); *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1083 (Fed.Cir. 1983) ("It is 'settled in the case law that the notice requirement of this statute does not apply where the patent is directed to a process or method." (*Quoting Bandag, Inc. v. Gerrard Tire Co.*, 704 F.2d 1578, 1581 (Fed. Cir. 1983)). Plaintiff has therefore complied with the marking requirements 35 U.S.C. 287(a).

V. UNITED STATES PATENT NO. 9,538,177

24. Plaintiff incorporates the above paragraphs herein by reference.

25. On January 3, 2017, United States Patent No. 9,538,177 ("the '177 Patent") was duly and legally issued by the United States Patent and Trademark Office. The '177 Patent is titled "Apparatus and Method for Buffering Context Arrays Referenced for Performing Entropy Decoding Upon Multi-Tile Encoded Picture and Related Entropy Decoder." A true and correct copy of the '177 Patent is attached hereto as Exhibit 2 and incorporated herein by reference.

26. Kreatosphere LLC is the assignee of all right, title, and interest in the '177 Patent, including all rights to enforce and bring actions for infringement and to collect damages for all

relevant times against infringers of the '177 Patent. Accordingly, Kreatosphere LLC possesses the exclusive right and standing to bring the present action for infringement of the '177 Patent by Defendant.

27. The invention in the '177 Patent relates to decoding a multi-tile video/image bitstream which transmits a plurality of multi-tile encoded pictures/compressed frames each having a plurality of tiles, and more particularly, to an apparatus and a method for buffering context arrays referenced for performing entropy decoding upon a multi-tile encoded picture and a related entropy decoder. (Ex. 2 at 1:19-25). The goal of the '177 Patent is to improve performance and lower cost production for the High-Efficiency Video Coding ("HEVC"). (*Id.* at 2:52-56).

28. The HEVC specification has pictures broken into smaller tiles that are then bound vertically and horizontally. (*Id*. at 1:29-37). These tiles are then scanned and indexed and decoded sequentially. (*Id.* at 1:38-41). This works well for some imagines, but the encoding/decoding of tiles based on a dependent tile (*e.g.*, motion vector prediction, intra prediction, or entropy coding among others) must consider data provided by other tiles. Vertical and horizontal buffers are therefore required to successfully decode a multi-tile encoded picture/compressed frame having dependent tiles. (*Id.* at 2:7-9). The vertical buffer is used for buffering decoded information of largest coding units (LCUs)/treeblocks (TBs) of an adjacent tile beside a vertical boundary (*e.g.*, a left vertical boundary) of a currently decoded tile, and the horizontal buffer is used for buffering decoded information of LCUs/TBs of another adjacent tile beside a horizontal boundary (*e.g.*, a top horizontal boundary) of the currently decoded tile. (*Id.* at 2:10-17).

29. This form of encoding and decoding requires a large buffer size for decoding the multi-tile encoding picture/compressed frame, which leads to high production costs, and general inefficiencies, and thus a need for an innovative entropy decoder design with lower production

costs and higher performance, which the inventors recognized. (*Id.* at 2:17-19, 38-48; 5:18-19; 7:51-57; 8:1-2; 10:22-29).

Asserted Claim

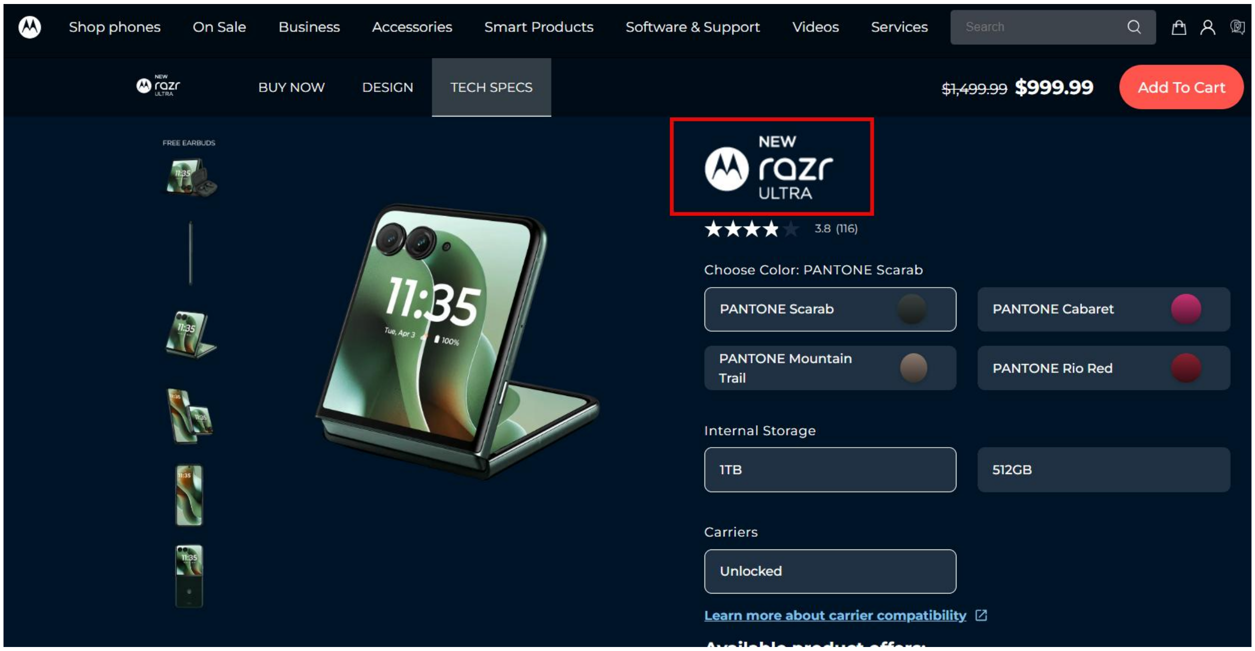
30. Claim 10 of the '177 Patent claims:

> A buffering method for buffering context arrays of a multi-tile encoded picture having a plurality of tiles, the buffering method comprising:
>
> buffering a first context array referenced for performing entropy decoding upon a first tile of the multi-tile encoded picture;
>
> buffering a second context array referenced for performing entropy decoding upon a second tile of the multi-tile encoded picture when the first tile is currently decoded according to the buffered first context array; and
>
> when entropy decoding of the first tile encounters a tile boundary, performing a multiplexing operation to switch between the buffered first context array and the buffered second context array;
>
> wherein entropy decoding of the second tile is started before the first tile is fully entropy decoded.

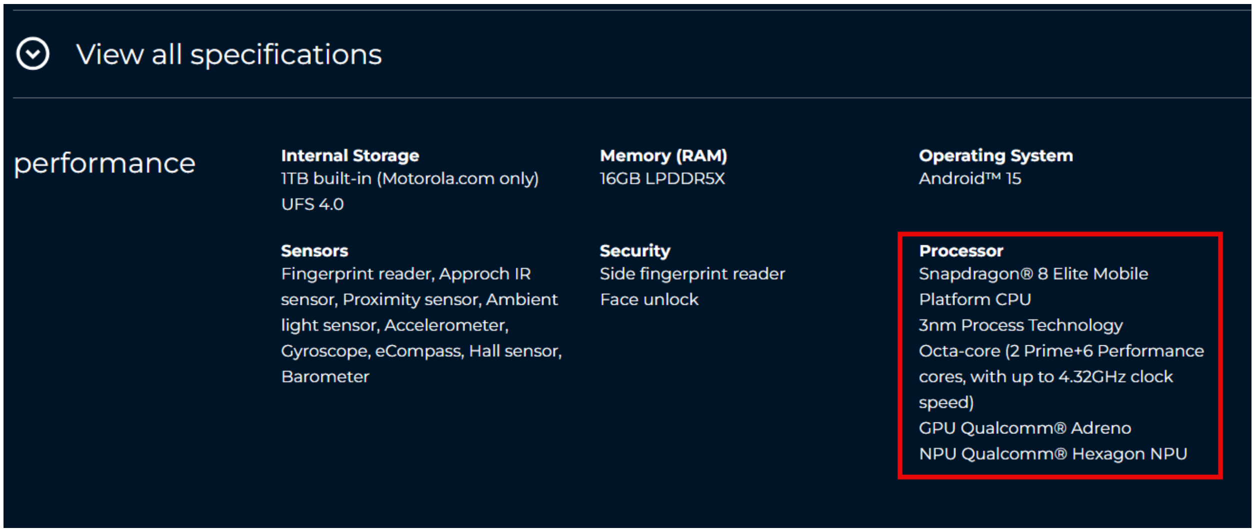
VI. COUNT II
(PATENT INFRINGEMENT OF UNITED STATES PATENT NO. 9,538,177)

31. Upon information and belief, Defendant has directly infringed claim 10 of the '177 Patent in Illinois, in this District, and elsewhere in the United States, by using and performing the claimed method by using the Motorola Razr ("Accused Instrumentality").

32. **Direct Infringement**. As explained below, the Accused Instrumentality practices a buffering method for buffering context arrays of a multi-tile encoded picture having a plurality of tiles. As shown below, the Accused Instrumentality supports HEVC standard for video encoding/decoding. HEVC standard provides a buffering method for buffering context arrays (*e.g.*, CABAC context variables) of a multi-tile encoded picture having a plurality of tiles (*e.g.*, multiple CTU rows).



(*E.g.*, https://www.motorola.com/us/en/p/phones/razr/razr-ultra/pmipmhn40ms?srsltid=AfmBOooyE41y2r7MCCQUHhyNZknkCSUg6K0j6F7KOYF_wvujXRd1CING&pn=PB770067US&tab=techspecs).



(*E.g.*, https://www.motorola.com/us/en/p/phones/razr/razr-ultra/pmipmhn40ms?srsltid=AfmBOooyE41y2r7MCCQUHhyNZknkCSUg6K0j6F7KOYF_wvujXRd1CING&pn=PB770067US&tab=techspecs).

Save settings

- **Save location** - When you take photos or videos, you can embed data about the location where you took them.
- **Efficient videos** - Reduce file size for UHD videos by saving as H.265/HEVC. Note: Some platforms may not support the HEVC format.

(*E.g.*, https://en-us.support.motorola.com/app/answers/detail/a_id/180634/~/camera-settings---motorola-razr-50-ultra).

In order to overcome the limitations of the parallelization strategies employed in H.264 | MPEG-4 AVC, HEVC provides VCL-based coding tools that are specifically designed to enable processing on high-level parallel architectures. Two new tools aiming at facilitating high-level parallel processing have been included in the HEVC standard [9, 10, 18]:

- **Wavefront Parallel Processing (WPP)**: A parallel processing approach along the wavefront scheduling principle, which is based on a partitioning of the picture into CTU rows such that the dependencies between CTUs of different partitions, both in terms of predictive coding and entropy coding, are preserved to a large extent.

(*E.g.*, https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/High%20Efficiency%20Video%20Coding%20%28HEVC%29_%20Algorithms%20and%20Architectures%20%5BSze%2C%20Budagavi%20%26%20Sullivan%202014-08-24%5D.pdf).

Both of these tools allow subdivision of each picture into multiple partitions that can be processed in parallel. Each partition contains an integer number of CTUs that may or may not have dependencies on CTUs of other partitions. When WPP or tiles are enabled, typically for each partition a separate slice segment subset is used such that the corresponding entry point offsets (in the slice segment header) indicate the start positions of all picture partition substreams (except for the first substream) in the slice segment. This is necessary for each core to immediately access the partition it has been assigned to decode. More details about parallel partition access are given in Sect. 3.3.2.3 below.

(*E.g.*, https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/High%20Efficiency%20Video%20Coding%20%28HEVC%29_%20Algorithms%20and%20Architectures%20%5BSze%2C%20Budagavi%20%26%20Sullivan%202014-08-24%5D.pdf).

3.3.2.2 Wavefront Parallel Processing (WPP)

When wavefront parallel processing (WPP) is enabled in HEVC, each CTU row of a picture constitutes a separate partition [10, 18]. WPP is enabled/disabled by the PPS syntax element `entropy_coding_sync_enabled_flag`. As shown in Fig. 3.12, in WPP mode each CTU row is processed relative to its preceding CTU row by using a delay of two consecutive CTUs. In this way, no dependencies between consecutive CTU rows are broken at the partition boundaries except for the CABAC context variables at the end of each CTU row. To mitigate the potential loss in coding efficiency that would result from the conventional CABAC initialization at the starting point of each CTU row, the content of the (partially) adapted CABAC context variables are propagated from the encoded/decoded second CTU of the preceding CTU row to the first CTU of the current CTU row, as shown in Fig. 3.12. As a result, the coding efficiency losses introduced by WPP are relatively small compared to the case of a picture encoding using no WPP but with otherwise identical settings [6, 10]. Also, WPP does not change the regular raster scan order of CTUs. Furthermore, by using a relatively simple CABAC transcoding technique, a WPP bitstream can be transcoded to or from a non-WPP bitstream without any change to the picture reconstruction process [7].

When WPP is enabled, a number of threads up to the number of CTU rows in a picture can work in parallel to process the individual CTU rows, where the number of CTU rows depends on the ratio of the picture height in luma samples and the luma CTB size in either width or height.

By using wavefront parallel processing in a decoder, each decoding thread processes a single CTU row of the picture. Since the CTU dependencies need to be maintained between the decoding threads, the scheduling of the thread processing must be organized in such a way that for each CTU the decoding of its top right

(*E.g.*, https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/High%20Efficiency%20Video%20Coding%20%28HEVC%29_%20Algorithms%20and%20Architectures%20%5BSze%2C%20Budagavi%20%26%20Sullivan%202014-08-24%5D.pdf).

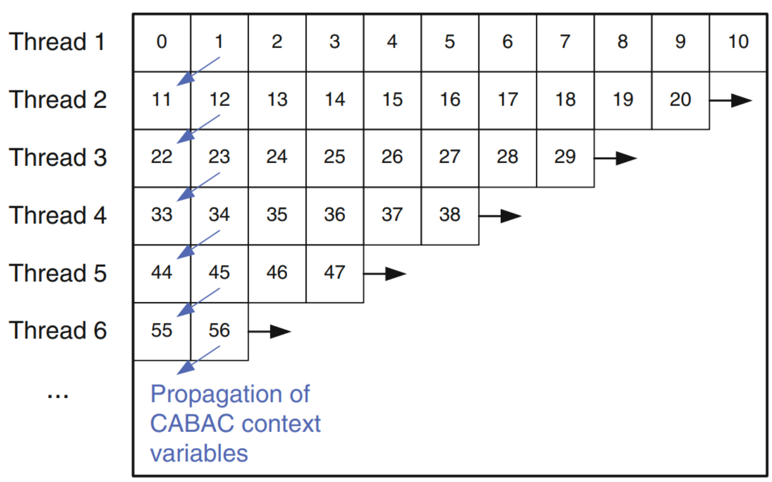


Fig. 3.12 Wavefront parallel processing along CTU rows and propagation of CABAC context variables from CTU1 to CTU11, from CTU12 to CTU22, . . . , from CTU45 to CTU55, and so on

(*E.g.*, https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/High%20Efficiency%20Video%20Coding%20%28HEVC%29_%20Algorithms%20and%20Architectures%20%5BSze%2C%20Budagavi%20%26%20Sullivan%202014-08-24%5D.pdf).

CABAC Context-based Adaptive Binary Arithmetic Coding

(*E.g.*, https://www.itu.int/rec/T-REC-H.265).

Thus, CABAC in its improved form, both with respect to throughput speed and compression efficiency, became the single entropy coding method of the HEVC standard.

The basic design of CABAC involves the key elements of binarization, context modeling, and binary arithmetic coding. These elements are illustrated as the main algorithmic building blocks of the CABAC encoding block diagram in Fig. 8.1. Binarization maps the syntax elements to binary symbols (bins). Context modeling estimates the probability of each non-bypassed (i.e., regular coded) bin based on some specific context. Finally, binary arithmetic coding compresses the bins to bits according to the estimated probability.

(*E.g.*, https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/High%20Efficiency%20Video%20Coding%20%28HEVC%29_%20Algorithms%20and%20Architectures%20%5BSze%2C%20Budagavi%20%26%20Sullivan%202014-08-24%5D.pdf).

The storage process for context variables is applied as follows:

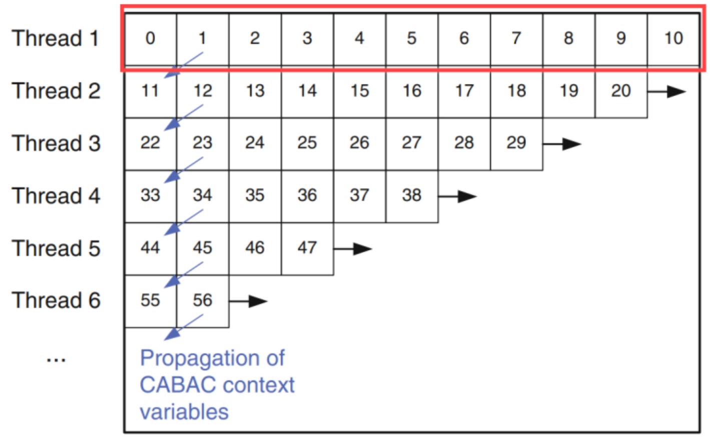
– When ending the parsing of the CTU syntax in clause 7.3.8.2, entropy_coding_sync_enabled_flag is equal to 1 and either CtbAddrInRs % PicWidthInCtbsY is equal to 1 or both CtbAddrInRs is greater than 1 and TileId[CtbAddrInTs] is not equal to TileId[CtbAddrRsToTs[CtbAddrInRs − 2]], the storage process for context variables, Rice parameter initialization states, and palette predictor variables as specified in clause 9.3.2.4 is invoked with TableStateIdxWpp, TableMpsValWpp, TableStatCoeffWpp when persistent_rice_adaptation_enabled_flag is equal to 1, and PredictorPaletteSizeWpp and PredictorPaletteEntriesWpp when palette_mode_enabled_flag is equal to 1 as outputs.

(*E.g.*, https://www.itu.int/rec/T-REC-H.265).

33. The Accused Instrumentality performs the step of buffering a first context array referenced for performing entropy decoding upon a first tile of the multi-tile encoded picture. Upon information and belief, the Accused Instrumentality complies with the HEVC standard. As shown below, the HEVC standard provides WPP method which comprises buffering a first context array

(*e.g.*, storing CABAC context variables for a first CTU row/Thread 1) referenced for performing entropy decoding upon a first tile (e.g., a first CTU row/Thread 1) of the multi-tile encoded picture.

Fig. 3.12 Wavefront parallel processing along CTU rows and propagation of CABAC context variables from CTU1 to CTU11, from CTU12 to CTU22, . . . , from CTU45 to CTU55, and so on



(*E.g.*, https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/High%20Efficiency%20Video%20Coding%20%28HEVC%29_%20Algorithms%20and%20Architectures%20%5BSze%2C%20Budagavi%20%26%20Sullivan%202014-08-24%5D.pdf).

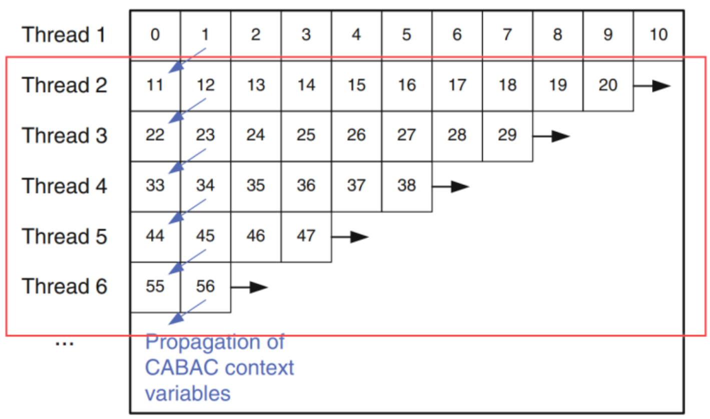
As an additional small overhead in processing, WPP requires to store the content of all CABAC context variables after having finished encoding/decoding of the second CTU in each CTU row. Beyond that, however, WPP does not require any extra handling of partition borders to preserve the dependencies utilized by entropy encoding/decoding, in-picture prediction or in-loop filtering. An example WPP scheme for executing all HEVC decoder operations within the hybrid video coding loop can be found in [6].

(*E.g.*,https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/High%20Efficiency%20Video%20Coding%20%28HEVC%29_%20Algorithms%20and%20Architectures%20%5BSze%2C%20Budagavi%20%26%20Sullivan%202014-08-24%5D.pdf).

34. The Accused Instrumentality performs the step of buffering a second context array referenced for performing entropy decoding upon a second tile of the multi-tile encoded picture when the first tile is currently decoded according to the buffered first context array. Upon information and belief, the Accused Instrumentality complies with the HEVC standard. As shown

below the HEVC standard performs the WPP method which comprises buffering a second context array (*e.g.*, storing CABAC context variables for a second CTU row/Thread 2 or any other CTU rows from Thread 3 to Thread 6) referenced for performing entropy decoding upon a second tile (*e.g.*, a second CTU row/Thread 2 or any other CTU rows from Thread 3 to Thread 6) of the multi-tile encoded picture when the first tile is currently decoded according to the buffered first context array (*e.g.*, CTU rows/Thread 2 – Thread 6 are all decoded in parallel with the first CTU row/Thread 1).

Fig. 3.12 Wavefront parallel processing along CTU rows and propagation of CABAC context variables from CTU1 to CTU11, from CTU12 to CTU22, . . . , from CTU45 to CTU55, and so on



(*E.g.*, https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/High%20Efficiency%20Video%20Coding%20%28HEVC%29_%20Algorithms%20and%20Architectures%20%5BSze%2C%20Budagavi%20%26%20Sullivan%202014-08-24%5D.pdf).

> As an additional small overhead in processing, WPP requires to store the content of all CABAC context variables after having finished encoding/decoding of the second CTU in each CTU row. Beyond that, however, WPP does not require any extra handling of partition borders to preserve the dependencies utilized by entropy encoding/decoding, in-picture prediction or in-loop filtering. An example WPP scheme for executing all HEVC decoder operations within the hybrid video coding loop can be found in [6].

(*E.g.*, *id.*).

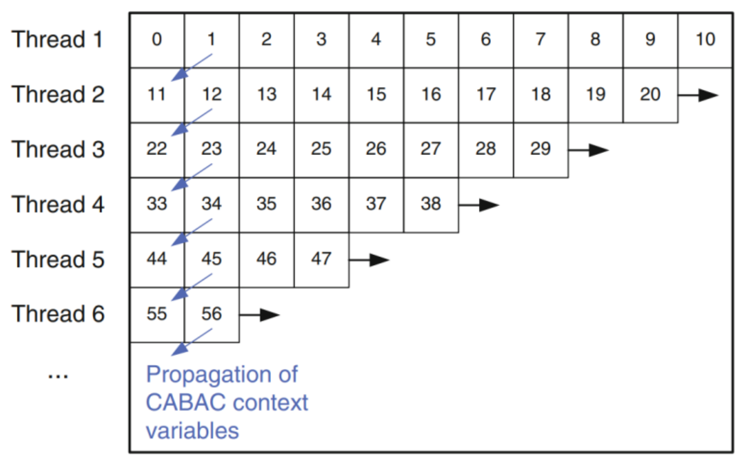
> By using wavefront parallel processing in a decoder, each decoding thread processes a single CTU row of the picture. Since the CTU dependencies need to be maintained between the decoding threads, the scheduling of the thread processing must be organized in such a way that for each CTU the decoding of its top right neighboring CTU in the preceding CTU row must have been finished. In other words, at any time the thread processing of the preceding CTU row must have processed two consecutive CTUs more than the thread processing of the current CTU row, which results in a "wavefront" of CTUs rolling from the top left to the bottom right corner of the picture, as illustrated in Fig. 3.12. This is why the wavefront dependencies do not allow all threads of processing CTU rows to start decoding simultaneously. Consequently, the row-wise CTU processing threads cannot finish decoding at the same time at the end of each row. This

(*E.g.*, *id.*).

35. The Accused Instrumentality performs the step of when entropy decoding of the first tile encounters a tile boundary, performing a multiplexing operation to switch between the buffered first context array and the buffered second context array. Upon information and belief, the Accused Instrumentality complies with the HEVC standard. As shown below, the HEVC standard provides the WPP method when entropy decoding of the first tile (e.g., decoding of the first CTU row/Thread 1) encounters a tile boundary (*e.g.*, decoding of first CTU row reaches the end of that row, *i.e.*, vertical boundary), performing a multiplexing operation to switch between the buffered first context array and the buffered second context array (*e.g.*, resources are allocated to another CTU row or any of the Thread 2-Thread 6 when the first CTU row is finished decoding). Further, when decoding of the first CTU row reaches its end (*e.g.*, CTU 10), CTU rows 2-6 are still in process of decoding because each CTU row can only start decoding after two CTUs are decoded in the preceding row. On information and belief, when the first row finishes decoding, the processor core can continue to decode any of the rows below the first row that was assigned to it and that has not finished. This requires a switch to the corresponding buffered context array which is used for decoding of that CTU row. Additionally, it is also possible that a processor core interweavingly decodes two adjacent CTU rows as long as the top CTU row of the two adjacent

CTU rows precedes the bottom CTU row by two CTUs. In this scenario, the processor core can first decode the top row and pause at a CTU as long as decoding passes the first two CTUs, then the processor core switches to the bottom row for decoding several CTUs, and switches back to the top row where it is left off. Hence the single processor core can interleave decoding of two CTU rows by time-slicing when dependencies allow, and the horizontal boundary between them is crossed each time the processor core switches to the other CTU row and each cross requires a switch to the corresponding buffered context array which is used for decoding of that CTU row. Interleaving decoding could happen because a row may temporarily stall because it is waiting for the row above to decode more CTUs and instead of idling, the core can decode CTUs from another row whose dependencies are satisfied.

Fig. 3.12 Wavefront parallel processing along CTU rows and propagation of CABAC context variables from CTU1 to CTU11, from CTU12 to CTU22, . . . , from CTU45 to CTU55, and so on



(*E.g.*, https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/High%20Efficiency%20Video%20Coding%20%28HEVC%29_%20Algorithms%20and%20Architectures%20%5B

Sze%2C%20Budagavi%20%26%20Sullivan%202014-08-24%5D.pdf).

> Both of these tools allow subdivision of each picture into multiple partitions that can be processed in parallel. Each partition contains an integer number of CTUs that may or may not have dependencies on CTUs of other partitions. When WPP or tiles are enabled, typically for each partition a separate slice segment subset is used such that the corresponding entry point offsets (in the slice segment header) indicate the start positions of all picture partition substreams (except for the first substream) in the slice segment. This is necessary for each core to immediately access the partition it has been assigned to decode. More details about parallel partition access are given in Sect. 3.3.2.3 below.

(*E.g.*, *id.*).

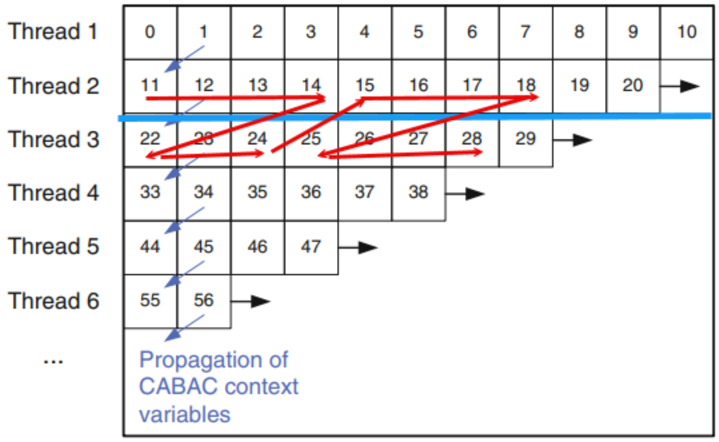
> Multi-threading in the software context refers to a programming model in which the computation is specified in multiple independent units called threads that share some resources, specifically memory. These threads can run in a time division or in a parallel manner depending on the implementation and underlying hardware. Threads usually communicate via shared memory, and have to use synchronization operations to ensure a proper use of shared resources and to satisfy ordering constraints in the program. Commonly synchronization statements such as locks, semaphores, barriers, and condition variables are used to control the progress among the threads.

(*E.g.*, *id.*).

> By using wavefront parallel processing in a decoder, each decoding thread processes a single CTU row of the picture. Since the CTU dependencies need to be maintained between the decoding threads, the scheduling of the thread processing must be organized in such a way that for each CTU the decoding of its top right neighboring CTU in the preceding CTU row must have been finished. In other words, at any time the thread processing of the preceding CTU row must have processed two consecutive CTUs more than the thread processing of the current CTU row, which results in a "wavefront" of CTUs rolling from the top left to the bottom right corner of the picture, as illustrated in Fig. 3.12. This is why the wavefront dependencies do not allow all threads of processing CTU rows to start decoding simultaneously. Consequently, the row-wise CTU processing threads cannot finish decoding at the same time at the end of each row. This

(*E.g.*, *id.*).

Fig. 3.12 Wavefront parallel processing along CTU rows and propagation of CABAC context variables from CTU1 to CTU11, from CTU12 to CTU22, . . . , from CTU45 to CTU55, and so on



(*E.g.*, *id.*).

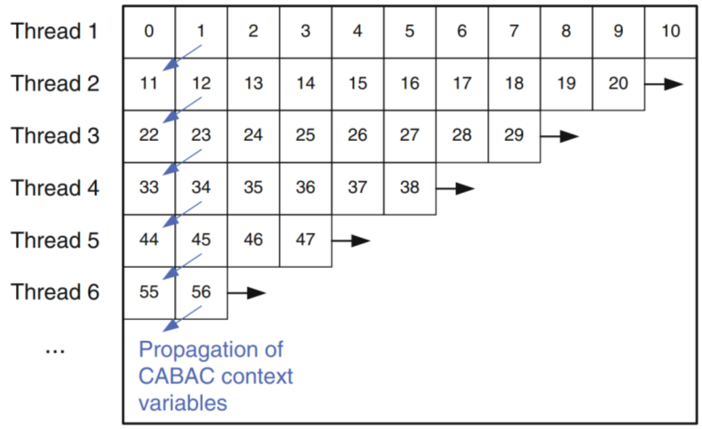
36. The Accused Instrumentality performs the step of wherein entropy decoding of the second tile is started before the first tile is fully entropy decoded. Upon information and belief, the Accused Instrumentality complies with the HEVC standard. As shown below, the HEVC standards provides WPP method wherein entropy decoding of the second tile (*e.g.*, any CTU row of CTU rows 2-6) is started before the first tile (*e.g.*, first CTU) is fully entropy decoded (*e.g.*, entropy decoding of the second tile can start as soon as it's preceding row finishes decoding the first two CTUs).

> By using wavefront parallel processing in a decoder, each decoding thread processes a single CTU row of the picture. Since the CTU dependencies need to be maintained between the decoding threads, the scheduling of the thread processing must be organized in such a way that for each CTU the decoding of its top right neighboring CTU in the preceding CTU row must have been finished. In other words, at any time the thread processing of the preceding CTU row must have processed two consecutive CTUs more than the thread processing of the current CTU row, which results in a "wavefront" of CTUs rolling from the top left to the bottom right corner of the picture, as illustrated in Fig. 3.12. This is why the wavefront dependencies do not allow all threads of processing CTU rows to start decoding simultaneously. Consequently, the row-wise CTU processing threads cannot finish decoding at the same time at the end of each row. This

(*E.g.*, https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/High%20Efficiency%20Video%20Coding%20%28HEVC%29_%20Algorithms%20and%20Architectures%20%5B

Sze%2C%20Budagavi%20%26%20Sullivan%202014-08-24%5D.pdf).

Fig. 3.12 Wavefront parallel processing along CTU rows and propagation of CABAC context variables from CTU1 to CTU11, from CTU12 to CTU22, . . . , from CTU45 to CTU55, and so on



(*E.g.*, *id.*).

37. **Indirect Infringement**. Upon information and belief, Defendant has been and now is indirectly infringing by way of inducing infringement and contributing to the infringement of claim 10 of the '177 Patent in the State of Illinois, in this District, and elsewhere in the United States, by providing the Accused Instrumentality for use as described above by Defendant's customers. Defendant advertised, offered for sale, and/or sold the Accused Instrumentality to its customers for use in a manner that Defendant knew infringed claim 10 of the '177 Patent. For example, Defendant provided marketing material that the Accused Instrumentality performs the claimed buffering method for buffering context arrays of a multi-tile encoded picture having a plurality of tiles as claimed in claim 10 of the '177 Patent. (*Supra* ¶¶32-36 (identifying marketing materials)).

38. On information and belief, since Defendant became aware of the '177 Patent and the infringement at least as of the date of the service of the Original Complaint, Defendant is and has been committing the act of inducing infringement by specifically intending to induce infringement by providing the Accused Instrumentality to its customers and by aiding and abetting

its use as demonstrated by the marketing materials in a manner known to infringe by Defendant. Since becoming aware of the infringing use of the Accused Instrumentality, Defendant knew that the use of the Accused Instrumentality by its customers as instructed constituted direct patent infringement. Despite this knowledge, Defendant continued to encourage and induce its customers to use the Accused Instrumentality to infringe as described above and provided instructions for using the Accused Instrumentality to infringe, including through instructional materials, support, and user's guides. Exemplary materials are cited above. (*Supra* ¶¶32-36 (identifying marketing materials)). Defendant therefore knowingly induced infringement and specifically intended to encourage and induce the infringement of the '177 Patent by its customers.

39. On information and belief, since Defendant became aware of the infringement at least as of the date of the service of the Original Complaint, Defendant is and has been committing the act of contributory infringement by intending to provide the identified Accused Instrumentality to its customers knowing that it is a material part of the invention, knowing that its use was made and adapted for infringement of the '177 Patent, and further knowing that the accused use of the Accused Instrumentality is not a staple article or commodity of commerce suitable for substantially non-infringing use. As described above, Defendant was aware that all material claim limitations are satisfied by the use and implementation of the Accused Instrumentality by Defendant's customers in the manner described above yet continued to provide the Accused Instrumentality to its customers knowing that it is a material part of the invention. (*Supra* ¶¶32-36 (identifying marketing materials)). As described above, since learning of the infringement, Defendant knew that the use and implementation of the Accused Instrumentality by its customers was made and adapted for infringement of the '177 Patent. (*Id.*). A new act of direct infringement occurred each time a customer implemented and/or used the Accused Instrumentality in the manner described

above. After Defendant became aware that the use of the Accused Instrumentality infringes claim 10 of the '177 Patent, Defendant knew that each such new use was made and adapted for infringement of claim 10 of the '177 Patent and Defendant continued to advertise and provide the Accused Instrumentality for such infringing activities. (*Supra* ¶¶32-36 (identifying marketing materials)). Furthermore, as described more fully above, the Accused Instrumentality has functionality designed to perform the steps in the manner described above and is therefore not a staple article or commodity of commerce suitable for substantially non-infringing use. (*Id.*).

40. Plaintiff has been damaged as a result of Defendant's infringing conduct. Defendant is thus liable to Plaintiff for damages in an amount that adequately compensates Plaintiff for such Defendant's infringement of the '177 Patent, *i.e.*, in an amount that by law cannot be less than would constitute a reasonable royalty for the use of the patented technology, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

41. Unless a preliminary and permanent injunction are issued enjoining Defendant and all others acting in active concert therewith from infringing the '177 Patent, Plaintiff will be greatly and irreparably harmed.

42. Plaintiff is only asserting a method claim in the '177 Patent and as such the marking requirements of 35 U.S.C. 287(a) do not apply. *Crown Packaging Technology, Inc. v. Rexam, Beverage Can Co.*, 559 F.3d 1308, 1316-1317 (Fed. Cir. 2009) ("Because Rexam asserted only the method claims of the '839 patent, the marking requirement of 35 U.S.C. 287(a) does not apply."); *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1083 (Fed.Cir. 1983) ("It is 'settled in the case law that the notice requirement of this statute does not apply where the patent is directed to a process or method." (*Quoting Bandag, Inc. v. Gerrard Tire Co.*, 704 F.2d 1578,

1581 (Fed. Cir. 1983)). Plaintiff has therefore complied with the marking requirements 35 U.S.C. 287(a).

VII. JURY DEMAND

Plaintiff, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

VIII. PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully requests that the Court find in its favor and against Defendant, and that the Court grant Plaintiff the following relief:

a. Judgment that claim 11 of United States Patent No. 8,265,575 has been infringed and is being infringed, either literally and/or under the doctrine of equivalents, directly and/or indirectly, by Defendant;

b. Judgment that claim 10 of United States Patent No. 9,538,177 has been infringed and is being infringed, either literally and/or under the doctrine of equivalents, directly and/or indirectly, by Defendant;

c. Judgment that Defendant account for and pay to Plaintiff all damages to and costs incurred by Plaintiff because of Defendant's infringing activities and other conduct complained of herein, and an accounting of all infringements and damages not presented at trial;

d. That Defendants be preliminarily and permanently enjoined from any further activity or conduct that infringes claim 11 of United States Patent No. 8,265,575 and/or claim 10 of United States Patent No. 9,538,177;

e. That Plaintiff be granted pre-judgment and post-judgment interest on the damages caused by Defendant's infringing activities and other conduct complained of herein; and

f. That Plaintiff be granted such other and further relief as the Court may deem just and proper under the circumstances.

July 17, 2026

DIRECTION IP LAW

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