

**BNR'S INFRINGEMENT CONTENTIONS**

**Exhibit C – Infringement of U.S. Patent No. 8,416,862**

Asserted Claims	Samsung Galaxy S10 <sup>1</sup>
<p>9. A wireless communication device comprising:</p>	<p>To the extent that the preamble is found to be limiting, the Samsung Galaxy S10 is a wireless communication device.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>

<sup>1</sup>Device images presented in Exhibit C are images of LG’s Samsung Galaxy S10. The features presented in those images are substantially similar in all material respects to the analogous features of the other devices accused of infringing the United States Patent No. 8,416,862 - see attached Annex. BNR’s use of the images of LG’s Samsung Galaxy S10 throughout Exhibit C is exemplary and provided to help explain BNR theory of infringement, and is not intended to limit BNR’s infringement claims to only this device.

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[i] a plurality of Radio Frequency (RF) components operable to receive an RF signal and to convert the RF signal to a baseband signal; and

The Samsung Galaxy S10 includes a plurality of Radio Frequency (RF) components operable to receive an RF signal and to convert the RF signal to a baseband signal.

The Samsung Galaxy S10 complies with the 802.11ac standard (“Part 11: Wireless LAN Medium, Access Control (MAC) and Physical Layer (PHY) Specifications”).

**Connectivity**

Wi-Fi ?

802.11 a/b/g/n/ac/ax 2.4G+5GHz,  
HE80, MIMO, 1024-QAM

See <https://www.samsung.com/us/mobile/phones/galaxy-s/galaxy-s10-128gb-unlocked-sm-g973uzbaxaa/#specs>, last accessed January 14, 2020.

As shown below, the Samsung Galaxy S10 supports beamformee capabilities and therefore must comply with the beamforming sections of the 802.11ac, which includes beamforming related features of Clause 19 and Clause 21.

**Connectivity**

Wi-Fi ?

802.11 a/b/g/n/ac/ax 2.4G+5GHz,  
HE80, MIMO, 1024-QAM

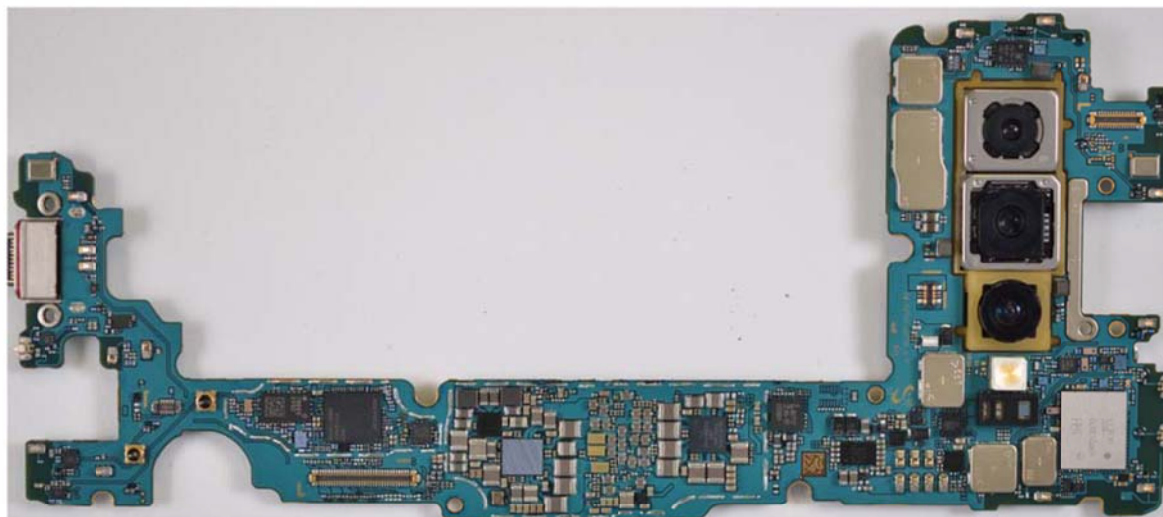
See <https://www.samsung.com/us/mobile/phones/galaxy-s/galaxy-s10-128gb-unlocked-sm-g973uzbaxaa/#specs>, last accessed January 14, 2020.

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[ii] a baseband processing module operable to:

The Samsung Galaxy S10 includes a baseband processing module.



[ii][a] receive a preamble sequence carried by the baseband signal

The baseband processing module in the Samsung Galaxy S10 is operable to receive a preamble sequence carried by the baseband signal. First, the Samsung Galaxy S10 complies with the 802.11ac standard (“Part 11: Wireless LAN Medium, Access Control (MAC) and Physical Layer (PHY) Specifications”).

The Samsung Galaxy S10 complies with the 802.11ac standard (“Part 11: Wireless LAN Medium, Access Control (MAC) and Physical Layer (PHY) Specifications”).

Connectivity

Wi-Fi ?  
802.11 a/b/g/n/ac/ax 2.4G+5GHz,  
HE80, MIMO, 1024-QAM

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See <https://www.samsung.com/us/mobile/phones/galaxy-s/galaxy-s10-128gb-unlocked-sm-g973uzbaxaa/#specs>, last accessed January 14, 2020.

As shown below, the Samsung Galaxy S10 supports beamformee capabilities and therefore must comply with the beamforming sections of the 802.11ac, which includes beamforming related features of Clause 19 and Clause 21.



See <https://www.samsung.com/us/mobile/phones/galaxy-s/galaxy-s10-128gb-unlocked-sm-g973uzbaxaa/#specs>, last accessed January 14, 2020.

Any device that complies with the 802.11ac standard must be capable of receiving a preamble sequence carried by the baseband signal.

**21.3.8 VHT preamble**

**21.3.8.1 Introduction**

A VHT preamble is defined to carry the required information to operate in either single user or multi-user mode. To maintain compatibility with non-VHT STAs, specific non-VHT fields are defined that can be received by non-VHT STAs compliant with Clause 17 or Clause 19. The non-VHT fields are followed by VHT fields specific to VHT STAs.

See 802.11-2016 (p. 2538).

**21.3.11.2 Beamforming Feedback Matrix V**

Upon receipt of a VHT NDP sounding PPDU, the beamformee shall remove the space-time stream CSD in Table 21-11 from the measured channel before computing a set of matrices for feedback to the beamformer. The beamforming feedback matrix,  $V_{k,u}$ , found by the



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	<p>beamformee <math>u</math> for subcarrier <math>k</math> shall be compressed in the form of angles using the method described in 19.3.12.3.6. The angles, <math>\phi(k,u)</math> and <math>\psi(k,u)</math>, are quantized according to Table 9-68. The number of bits for quantization is chosen by the beamformee, based on the indication from the beamformer as to whether the feedback is requested for SU-MIMO beamforming or DLMU-MIMO beamforming. The compressed beamforming feedback using 19.3.12.3.6 is the only Clause 21 beamforming feedback format defined.</p> <p><i>See</i> 802.11-2016 (p. 2579).</p> <p><b>21.3.12 VHT preamble format for sounding PPDU</b>        NDP is the only VHT sounding format.</p> <p>The format of a VHT NDP PPDU is shown in Figure 21-28.</p> <div style="text-align: center;"> <table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">4 μs</td> <td style="text-align: center;">8 μs</td> <td style="text-align: center;">4 μs</td> <td style="text-align: center;">4 μs per VHT-LTF symbol</td> <td style="text-align: center;">4 μs</td> </tr> <tr> <td style="text-align: center;">L-STF</td> <td style="text-align: center;">L-LTF</td> <td style="text-align: center;">L-SIG</td> <td style="text-align: center;">VHT-SIG-A</td> <td style="text-align: center;">VHT-STF</td> <td style="text-align: center;">VHT-LTF</td> <td style="text-align: center;">VHT-SIG-B</td> </tr> </table> </div> <p><b>Figure 21-28—VHT NDP format</b></p> <p><i>See</i> 802.11-2016 (p. 2580).</p>	8 μs	8 μs	4 μs	8 μs	4 μs	4 μs per VHT-LTF symbol	4 μs	L-STF	L-LTF	L-SIG	VHT-SIG-A	VHT-STF	VHT-LTF	VHT-SIG-B
8 μs	8 μs	4 μs	8 μs	4 μs	4 μs per VHT-LTF symbol	4 μs									
L-STF	L-LTF	L-SIG	VHT-SIG-A	VHT-STF	VHT-LTF	VHT-SIG-B									
<p>ii][b] estimate a channel response based upon the preamble sequence</p>	<p>When the Samsung Galaxy S10 receives a preamble sequence, the baseband processing module is operable to estimate a channel response based upon the preamble sequence.</p> <p><b>21.3.8 VHT preamble</b>  <b>21.3.8.1 Introduction</b>        A VHT preamble is defined to carry the required information to operate in either single user or multi-user mode. To maintain compatibility with non-VHT STAs, specific non-VHT fields are defined that can be received by non-VHT STAs compliant with Clause 17 or Clause 19. The non-VHT fields are followed by VHT fields specific to VHT STAs.</p> <p><i>See</i> 802.11-2016 (p. 2538).</p>														

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