

Exhibit 11

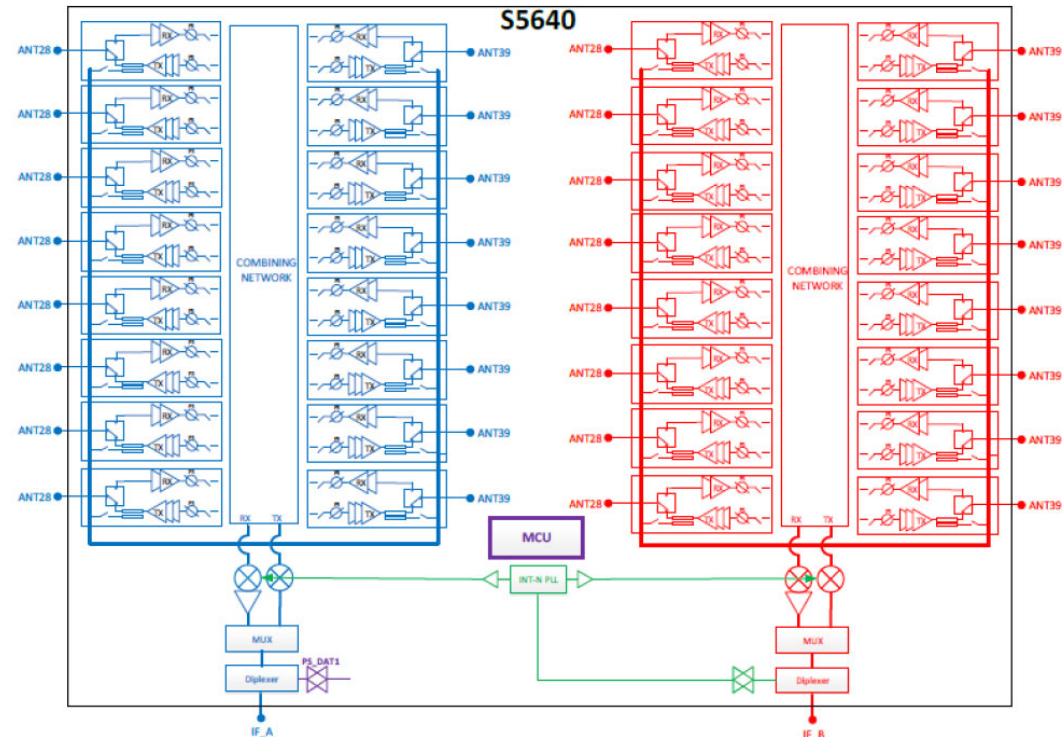
EXHIBIT 11 – U.S. Patent No. 11,063,625

Plaintiff asserts that at least the following products (“Accused Instrumentalities”) infringe the Asserted Claims of U.S. Patent No. 11,063,625: Galaxy S20 (SM-G980, SM-G981); Galaxy S20+ (SM-G985, SM-G986); Galaxy S20 Ultra (SM-G988); Galaxy S20 FE (SM-G780, SM-G781); Galaxy S21 (SM-G991); Galaxy S21+ (SM-G996); Galaxy S21 Ultra (SM-G998); Galaxy S21 FE (SM-G990); Galaxy S22 (SM-S901); Galaxy S22+ (SM-S906); Galaxy S22 Ultra (SM-S908); Galaxy S23 (SM-S911); Galaxy S23+ (SM-S916); Galaxy S23 Ultra (SM-S918); Galaxy S23 FE (SM-S711); Galaxy S24 (SM-S921); Galaxy S24+ (SM-S926); Galaxy S24 Ultra (SM-S928); Galaxy S24 FE (SM-S821); Galaxy S25 (SM-S931); Galaxy S25+ (SM-S936); Galaxy S25 Ultra (SM-S938); Galaxy S25 Edge (SM-S935); Galaxy Z Flip 3 (SM-F711); Galaxy Z Flip 4 (SM-F721); Galaxy Z Flip 5 (SM-F731); Galaxy Z Flip 6 (SM-F741); Galaxy Z Fold 3 (SM-F926); Galaxy Z Fold 4 (SM-F936); Galaxy Z Fold 5 (SM-F946); Galaxy Z Fold 6 (SM-F956); Galaxy A51 (SM-A516x); Galaxy A53 (SM-A536x); Galaxy A56 (SM-A566x); Galaxy A36 (SM-A366x); Galaxy A26 (SM-A266); Galaxy Note 20 (SM-N981); Galaxy Note 20 Ultra (SM-N986) model smartphones

Claim 1	Correspondence in Accused Instrumentalities ¹
[1PRE] A method for avoiding radiation of a user or structure by a wireless device having at least one steerable antenna, comprising the steps of:	The Accused Instrumentalities, which include smartphones (i) are wireless devices, (ii) perform the claimed method as described in this table, and (iii) comprise at least one steerable antenna. The Accused Instrumentalities are wireless devices at least because they communicate via WiFi, LTE and/or 5G cellular networks. The at least one steerable antenna includes an antenna array that consists of multiple individual antenna elements arranged in a specific geometric pattern. Each element radiates a signal, and the combination of these signals forms the overall radiation pattern of the array. Beam steering is achieved by controlling the phase of the signals fed to each individual antenna element in the array.

¹ Unless indicated otherwise, the evidence cited in this table is representative of the operation of the Accused Instrumentalities and upon information and belief, the Accused Instrumentalities function in a substantially similar manner for purposes of this chart, unless indicated otherwise.

According to the A53 Operational Description, this particular Accused Instrumentality includes a “mmW Antenna Module,” which includes “two separate phased array chips (S5640).” Each phase array chip includes 20 antenna ports: 10 for 28 GHz band and 10 for 39 GHz band.



See fccid.io/A3LSMA536V/Operational-Description/A3LSMA536V-Operational-Description-Main-Part-R4-5651659.pdf (“A53 Operational Description”).

A teardown of a Galaxy S20 Ultra describes that this Accused Instrumentality includes “two Qualcomm RF ICs ... w/multilayer package substrate antenna array ...” See electronics360.globalspec.com/article/15093/teardown-samsung-galaxy-s20-ultra-5g

The “Criticality of 5G Modem to RF Integration; A look inside Samsung Galaxy S20 Ultra” article (<https://omdia.tech.informa.com/om006104/criticality-of-5g-modem-to-rf-integration-a>

look-inside-samsung-galaxy-s20-ultra) describes a teardown of the S20 Ultra, including that the Qualcomm RF ICs in the Galaxy S20 Ultra are QTM525 mmWave Antenna modules.

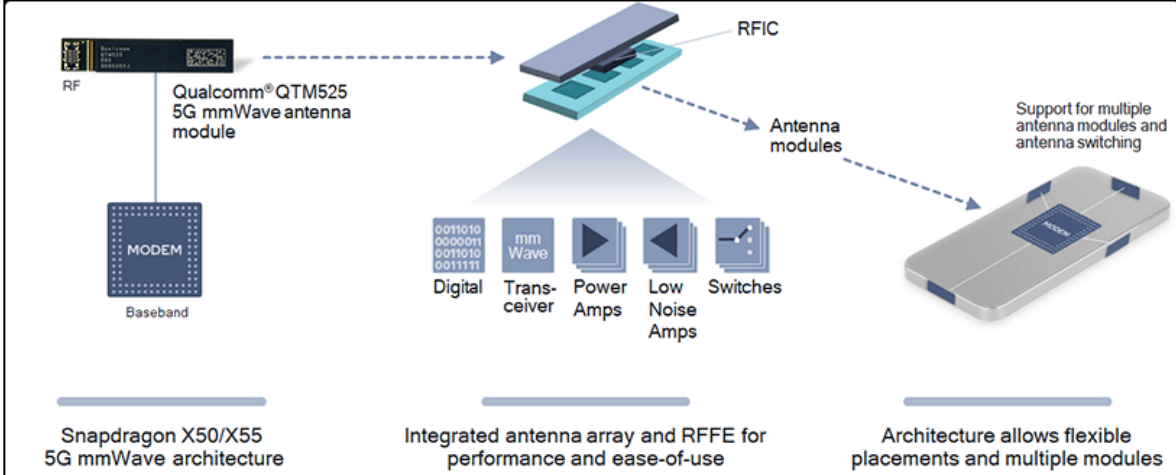
The Qualcomm article “5G Modems, RF and Antennas — Getting mmWave Data into the Device” describes the QTM525 mmWave antenna module as including an “array of tiny mmWave antenna elements ...” *See* www.qualcomm.com/developer/blog/2019/11/5g-modems-rf-and-antennas-getting-mmwave-data-device

The Qualcomm article further describes the QTM525 mmWave antenna module, in communication with the 5G modems (e.g., Snapdragon X50, X55, X60), as capable of beamforming and beam tracking to avoid obstructions. Such obstructions include the user (such as the head or hand when holding the phone) and nearby structures (such as walls or furniture), and the accused devices adjust their steerable antenna beams to avoid radiating in those direction.

mmWave technology works well in cities, where you can locate a small cell on top of a building and serve an entire block. In a dense, urban environment, the buildings would normally be an obstruction. But beamforming and beam tracking take advantage of them as an endless series of surfaces off of which the mmWaves can bounce.

On the device, multiple mmWave antenna modules like the QTM052 and QTM525 are located in different places, as shown in the image below. The baseband modem switches among the antenna modules, depending on the source of the strongest signal. All of that takes place in real time in fractions of a millisecond.

See id.

	 See <i>id.</i>
[1A] detecting in a three dimensional space, using one or more cameras, microphones, audio sensors, ultrasound sensors or transducers, range finders, capacitive sensors, gyroscopes, light detectors, or motion detectors, an orientation of said wireless device relative to either or both said user and said structure;	The Accused Instrumentalities include, among other things, proximity sensors for sensing proximity of an obstacle, such as a user body part, to the wireless device, and also for detecting an orientation of the wireless device. The sensor(s) used to detect the orientation of the device, such as proximity to an obstruction, include, but are not limited to, (i) a range finder embodied, in whole or in part, by the modem and RF front-end system of the Accused Instrumentalities, including the phased array module and associated transceiver, (ii) one or more capacitive sensors, (iii) one or more light detectors, and/or (iv) one or more gyroscopes. For example, the Accused Instrumentalities include infrared sources and detectors. Infrared is a form of light energy, so the Accused Instrumentalities include at least light detectors for sensing an orientation of the obstacle relative to the wireless device. <i>See</i> www.samsung.com/ph/support/mobile-devices/what-is-this-proximity-sensor-on-your-samsung-smartphone. How does the proximity sensor work? A proximity sensor consists of a light-emitting and light-receiving component. Infrared rays from the light-emitting component analyze the light reflected from physical objects and measure the distance between the object and the device. The proximity sensor is installed under the display, on all the latest Galaxy smartphones and is now capable of detecting the angle of the device. Make a call and bring the phone close to your ear. The screen will turn off as you move the phone away, and the screen will wake up.

The Accused Instrumentalities also include one or more gyroscopes that enable them to perform orientation detection. For example, the “Samsung Galaxy S21 Ultra Teardown” and “Samsung Galaxy S22 Chip ID” articles describe ASICs used in the Samsung Galaxy S21 Ultra and S22 Ultra, including the STMicroelectronics LSM6DSO. The STMicroelectronics LSM6DSO is 3-axis accelerometer/gyroscope combination chip. *See* <https://www.ifixit.com/Guide/Samsung+Galaxy+S22+Chip+ID/148072>; <https://www.ifixit.com/Teardown/Samsung+Galaxy+S21+Ultra+Teardown/141188>.

Together, the gyroscopes/accelerometers (which detect device orientation in three-dimensional space) and the proximity, capacitive, and light sensors (which detect the presence and location of the user or nearby structures) determine the orientation of the wireless device relative to either or both the user and the structure. *See* www.samsung.com/ph/support/mobile-devices/what-is-this-proximity-sensor-on-your-samsung-smartphone.

For example, the Accused Instrumentalities include accelerometers, capacitive sensors, gyroscopes, and proximity sensors in the form of ambient light sensors and/or infrared light sensor that can detect the presence of the user. The Accused Instrumentalities use one or more of these sensors to detect the location that the user of the Accused Instrumentalities is gripping the device. The sensors are located near antenna patch of the antenna arrays so that the corresponding antenna patch can be deactivated to avoid the user.

In another example, the A53 Operational Description describes a grip sensor configuration that determines the presence and location of the user with a smart capacitive sensor.

1.11 Grip Sensor : SX9380

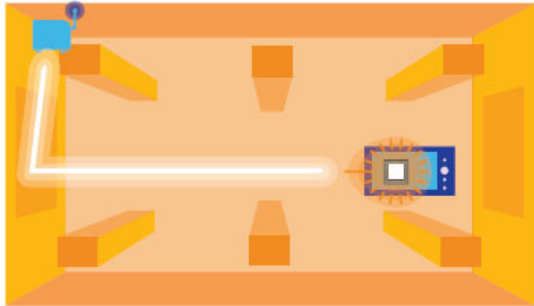
1.11.1 General Description

The SX9380 is a smart capacitive sensor for SAR (Specific Absorption Rate).

The resulting detection is used in portable electronic devices to reduce and control radio-frequency (RF) emission power in the presence of a human body, enabling significant performance advantages for manufacturers of electronic devices with electro-magnetic radiation sources to meet stringent emission regulations' criteria and Specific Absorption Rate (SAR) standards.

Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative

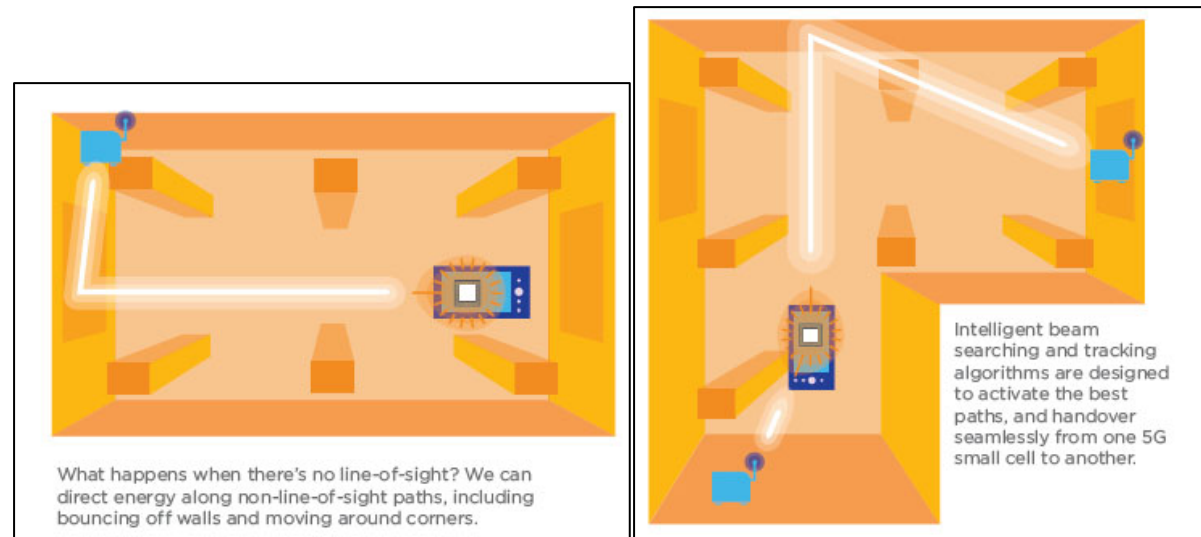
	that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.
[1B] determining zones or spans of directions in the three dimensional space corresponding with one or more directions of either or both said user and said structure relative to said at least one steerable antenna; and	The Accused Instrumentalities perform the step of determining zones or spans of directions in the three-dimensional space corresponding with one or more directions of either or both said user and said structure relative to said at least one steerable antenna. For example, the Accused Instrumentalities determines an area or location associated with an obstruction and deactivates a corresponding antenna in the antenna array. For example, the Accused Instrumentalities use one or more sensors to detect the location that the user of the Accused Instrumentalities is gripping the device and deactivates the corresponding antenna to avoid the user. These operations define zones or spans of directions in three-dimensional space that correspond to the directions of the user's body or surrounding structures relative to the steerable antenna. In another example, the Accused Instrumentalities can determine transmission areas associated with beams that are associated with high and low signal attenuation. The Qualcomm article “5G Modems, RF and Antennas — Getting mmWave Data into the Device” describes the QTM525 mmWave antenna module, included in certain Accused Instrumentalities, that allows “[t]he device and the network exchange information constantly, directing beams in a way they can best reach each other.” <u>See www.qualcomm.com/developer/blog/2019/11/5g-modems-rf-and-antennas-getting-mmwave-data-device</u> The images below, from the Qualcomm document, shows that the Snapdragon X50 5G modem can perform beam steering to avoid obstructions when direct line of sight transmission paths are not available.

	 What happens when there's no line-of-sight? We can direct energy along non-line-of-sight paths, including bouncing off walls and moving around corners.  Intelligent beam searching and tracking algorithms are designed to activate the best paths, and handover seamlessly from one 5G small cell to another. See https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/x50info11.pdf See claim elements [1PRE] and [1A] above. Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.
[1C] adjusting one or more beam radiation patterns of said at least one steerable antenna to radiate in one or more directions which are not in said zones or spans of directions in the three dimensional space, wherein said at least one steerable antenna is configured to steer or direct its energy in	The Accused Instrumentalities adjust one or more radiation patterns from the steerable antenna to direct energy in zones or spans of directions where obstacles were not detected, while avoiding spans or directions where obstacles were detected. The Qualcomm article “5G Modems, RF and Antennas — Getting mmWave Data into the Device” describes the QTM525 mmWave antenna module, included in certain Accused Instrumentalities, that allows “[t]he device and the network exchange information constantly, directing beams in a way they can best reach each other.”

particular directions while providing nulls or dead zones in other directions, and wherein said adjusting step adjusts the one or more beam radiation patterns for direction of energy to one or more of said particular directions while avoiding said zones or spans of directions in the three dimensional space, and

See www.qualcomm.com/developer/blog/2019/11/5g-modems-rf-and-antennas-getting-mmwave-data-device

In one example, the Qualcomm document below describes that the 5G modem available in certain Accused Instrumentalities as capable of avoiding obstructions in a direct line-of-sight transmission paths and selecting indirect transmission paths with lower signal attenuation. See <https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/x50info11.pdf>



At least by this manner, for example, the Accused Instrumentalities adjust the radiation patterns from the steerable antenna to direct energy in spans or directions where obstacles were not detected, while avoiding spans of directions where obstacles were detected. By steering beams away from obstructed directions, the phased-array antennas in the Accused Instrumentalities inherently place nulls or dead zones in those avoided directions, as required by the claim.

The A53 Operational Description describes that the Accused Instrumentality implements beamforming for 5G band n261.

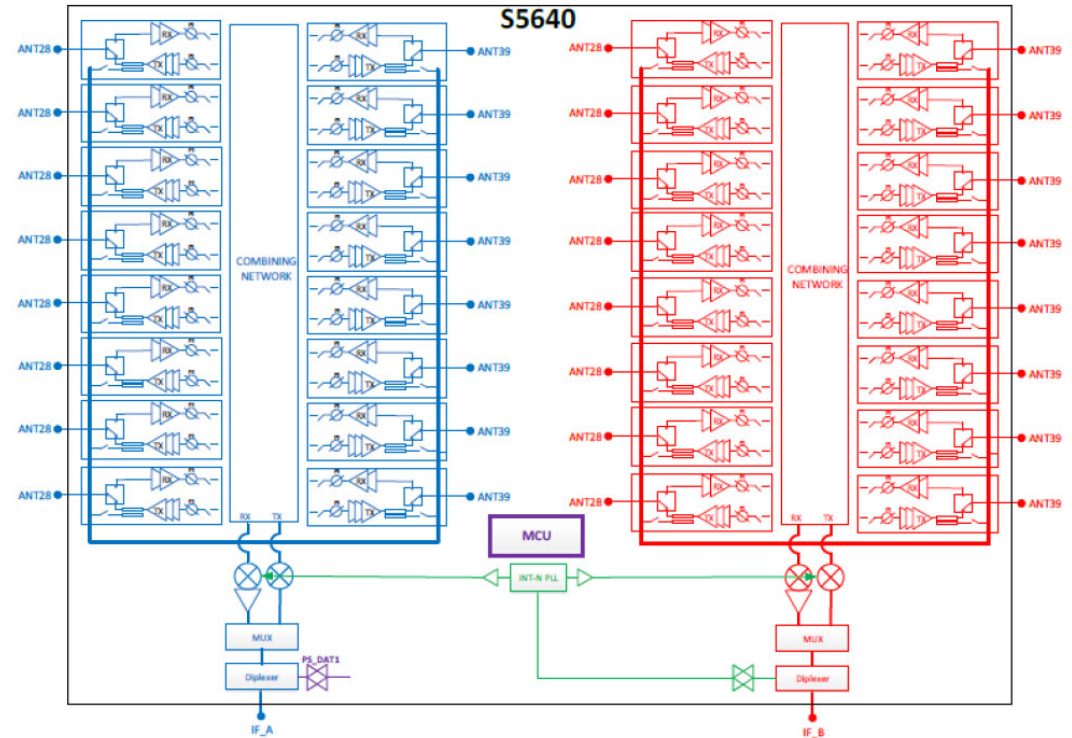
Beamforming| – n261

The mmWave operations in this device use beam-forming. The below beams are used in this device (no other beams or combinations of beams are supported.)

	Patch/Dipole	SISO/MIMO & Polarization	Beam ID	
ANT L	Patch	Single beam / V-pole	0	
			1	
			2	
			3	
			4	
			5	
			6	
		Single beam / H-pole		7
				8
				9
				10
				11
				12
				13
		Paired beam / MIMO	0	7
			1	8
			2	9
			3	10
			4	11
			5	12
			6	13

The A53 Operational Description confirms that the device implements beamforming for FR2 band n261 and n260, with multiple selectable beam indices and module configurations, such that one array is active at a time and other directions remain unenergized (i.e., nulls or dead zones). The same FCC filing further states that beam index and module selection affect power density and are considered in the device’s transmit antenna switching (TAS) algorithm, showing that the handset actively adjusts which beams to use based on operating conditions. In addition, the A53 Operational Description details the use of grip sensors, earpiece/receiver sensors, and earjack sensors, which trigger changes in transmit behavior when the user’s hand or head is near

	the antenna. These sensor inputs, together with the device's beam index selection, result in beam radiation patterns that are directed away from zones occupied by the user or nearby structures, thereby avoiding said zones or spans of directions in the three-dimensional space. Qualcomm's technical publications describing the QTM525 and Snapdragon X50/X55/X60 modems likewise confirm that these mmWave modules support beamforming and beam tracking to avoid obstructions, further evidencing that the Accused Instrumentalities adjust their steerable antennas to radiate in permitted directions while providing nulls or dead zones in obstructed directions. See https://www.qualcomm.com/developer/blog/2019/11/5g-modems-rf-and-antennas-getting-mmwave-data-device; www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/5G-Whitepaper-mmWave_Antenna_Module_Placement-Qualcomm.pdf; www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/x50info11.pdf. Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.
[1D] wherein said at least one steerable antenna operates on one or multiple bands and radiates at one or more frequencies in the range of 10 GHz to 500 GHz.	The steerable antenna arrays in the Accused Instrumentalities are for 5G bands operating above 10 GHz and less than 500 GHz. According to the A53 Operational Description, each phase array chip includes 20 antenna ports: 10 for 28 GHz band and 10 for 39 GHz band.



The A53 Operational Description describes that the Accused Instrumentality (e.g., SM-A536V model) implements beamforming for 5G band n261, which has a frequency of 27.5 - 28.35 GHz, which is in the range of 10 GHz to 500 GHz. In addition, 3GPP TS 38.101 defines Frequency Range 2 (FR2) as 24.25 GHz to 52.6 GHz, covering the 28 GHz and 39 GHz bands used by the Accused Instrumentalities.

Thus, the Accused Instrumentalities include at least one steerable antenna that operates on multiple bands (28 GHz and 39 GHz) and radiates at frequencies within the claimed range of 10 GHz to 500 GHz.

Claim 2	Correspondence in Accused Instrumentalities
[2] The method of claim 1, wherein said detecting step comprises one or more of: capturing one or more images with at least one camera; detecting ambient light or blockage thereof with at least one light sensor; detecting motion of said wireless device with at least one gyroscope; detecting one or more of audio or ultrasonic signals relating to the orientation of the user or structure with one or more of a microphone, ultrasonic sensor, or ultrasonic transducer; and detecting relative position of the user or structure with at least one capacitive sensor.	The Accused Instrumentalities detect an orientation of the wireless device relative to the obstacle at least by detecting ambient light or blockage thereof with at least one light sensor. In addition, as set forth in claim element [1A], the Accused Instrumentalities also include gyroscopes for detecting motion and capacitive sensors for detecting relative position of the use.
Claim 5	Correspondence in Accused Instrumentalities
[5] The method of claim 1 wherein said at least one steerable antenna or said another antenna uses one or more of: beamforming, beamsteering, beam or antenna element selection, adaptive beamforming, multibeam	The steerable antenna in the Accused Instrumentalities use at least beamforming and MIMO. <i>See</i> A53 Operational Description at p. 38. Accordingly, the Accused Instrumentalities use one or more of the antenna techniques, including at least beamforming and MIMO

combining, MIMO, phasing, beam switchable array, active combining, passive combining, and hybrid antenna structure.

Beamforming – n261

The mmWave operations in this device use beam-forming. The below beams are used in this device (no other beams or combinations of beams are supported.)

	Patch/Dipole	SISO/MIMO & Polarization	Beam ID	
ANT L	Patch	Single beam / V-pole	0	
			1	
			2	
			3	
			4	
			5	
			6	
		Single beam / H-pole		7
				8
				9
				10
				11
				12
				13
		Paired beam / MIMO	0	7
			1	8
			2	9
			3	10
			4	11
			5	12
			6	13

In addition, as set forth in claim elements [1PRE], [1A], and the discussion of beam index/module selection in the A53 Operational Description, the Accused Instrumentalities perform beam steering and beam or antenna element selection when adjusting which antenna modules and beam indices are active.

Claim 6	Correspondence in Accused Instrumentalities
The method of claim 1, wherein a directional radiating pattern of said one or more beams is different from a receiving pattern used in said step of receiving said signals.	The Accused Instrumentalities satisfy this limitation because their mmWave antenna systems, which operate in frequency ranges above 10 GHz (specifically, the 24 GHz, 28 GHz, and 39 GHz FR2 bands used for 5G), are designed to form and steer highly directional beams that inherently differ in their transmit and receive configurations. For example, the Accused Instrumentalities incorporate mmWave phased-array antenna modules to support 5G FR2 operation. These modules include multiple antenna elements driven by active beamforming integrated circuits. In operation, the modules implement different beam radiation patterns for transmission versus reception. On the transmit side, the beam pattern is shaped to maximize radiated energy in the direction of the serving base station. On the receive side, the beam pattern is configured to optimize signal collection, often using diversity combining, multipath capture, and adaptive steering. Because the phasing, feed networks, and beamforming coefficients applied in transmit mode differ from those in receive mode, the directional radiating pattern of the beams formed during transmission is necessarily different from the pattern used in reception. Accordingly, the Accused Instrumentalities practice Claim 6 because the directional radiating pattern of their transmit beams is different from the receiving pattern used in receiving signals. This distinction is fundamental to mmWave phased-array design and is documented in industry standards and reflected in publicly available information about Samsung’s 5G mmWave devices, including FCC equipment authorization filings that report separate antenna performance characteristics for transmit and receive paths. In addition to the A53 Operational Description (showing FR2 beamforming with selectable beam indices for transmission), the 3GPP NR specifications make clear that UEs perform receive-side beamforming and receive-beam switching based on CSI-RS resources, i.e., RX patterns are separately configured and selected from TX patterns. See 3GPP TS 38.214 (Rel-15/16) (RX beam management via CSI-RS), and 3GPP RAN2 text stating that “UE supports receive beamforming switching via NZP CSI-RS” (support mandatory in FR2). Qualcomm’s mmWave publications likewise show device-side beam tracking with SSB/CSI-RS beam indices as users move, evidencing dynamic receive beam selection. Thus, taken together with the FCC beam index/module evidence for TX, the Accused Instrumentalities necessarily employ

	different directional patterns for transmission versus reception. See 3GPP v.15.2.0, www.etsi.org/deliver/etsi_ts/138200_138299/138214/15.02.00_60/ts_138214v150200p.pdf .
Claim 7	Correspondence in Accused Instrumentalities
The method of claim 6 further comprising using time division duplexing for communication, using said one or more beams radiated by said at least one steerable antenna and signals received by at least one of said at least one steerable antenna.	The Accused Instrumentalities satisfy this limitation because, in mmWave operation (FR2 spectrum above 24 GHz), they communicate using time division duplexing (TDD). In FR2, all 5G NR bands are TDD-only, meaning the same steerable antenna arrays alternate between transmitting directional beams and receiving directional signals in time-separated slots. For example, the Accused Instrumentalities implement phased-array antenna modules that radiate beams in FR2 uplink slots and receive beams in FR2 downlink slots according to the 3GPP 5G NR TDD frame structure. This results in the use of the same steerable antenna(s) for both transmission and reception, with transmit and receive operations separated in time. Accordingly, the Accused Instrumentalities use TDD for communication, employing the same steerable antenna(s) for both transmission and reception. See, e.g., 3GPP TS 38.101-1, Table 5.2-1 (FR2 defined as TDD-only)
Claim 9	Correspondence in Accused Instrumentalities
[9] The method of claim 1 wherein the at least one steerable antenna operates on multiple bands.	The steerable antenna in the Accused Instrumentalities operates on multiple bands, such as the n260 and n261 bands. <i>See</i> A53 Operational Description at sheet 32.

NR Checklist

NR FR2 Operational Information	
Form Factor	Portable Handset
Frequency Range of each NR transmission band	NR Band n261
	NR Band n260
Channel Bandwidths (MHz)	NR Band n261: 50MHz, 100MHz
	NR Band n260: 50MHz, 100MHz
Subcarrier Spacing (kHz)	120
Total Number of Supported UL CCs (SISO)	2 (DFT-s-OFDM, CP-OFDM)
Total Number of Supported UL CCs (Tx Diversity)	2 (DFT-s-OFDM, CP-OFDM)
Total Number of Supported UL CCs (MIMO)	2 (CP-OFDM Only)
Modulations Supported in UL	DFT-s OFDM: $\pi/2$ -BPSK, QPSK, 16QAM, 64QAM CP OFDM: QPSK, 16QAM, 64QAM
LTE Anchor Bands (n260)	LTE Band 2/5/13/48/66
LTE Anchor Bands (n261)	LTE Band 2/5/13/48/66
Duplex Type (mmWave)	TDD

These are both 5G NR FR2 bands (n260: 37–40 GHz; n261: 27.5–28.35 GHz), within the 10–500 GHz range recited in Claim 1. Accordingly, the Accused Instrumentalities satisfy Claim 9 because their steerable antennas operate on multiple bands.

Claim 11	Correspondence in Accused Instrumentalities												
[11PRE] A wireless device for avoiding radiation of a user or structure, comprising:	The Accused Instrumentalities are wireless devices and avoid radiation of a user or structure (e.g., obstacle) as described below. See claim elements [11A]-[11J] below. See also claim element [1Pre] above.												
[1A] one or more sensors selected from the group consisting of cameras, microphones, audio sensors, ultrasound sensors or transducers, range finders, capacitive sensors, gyroscopes, light detectors, or motion detectors configured to detect in a three dimensional space an orientation of said wireless device relative to either or both said user and said structure;	See claim element [1A] above.												
[11B] one or more processors communicatively coupled to said one or more sensors;	The Accused Instrumentalities comprise one or more processors communicatively coupled to said one or more sensors. For example, the table below shows certain Accused Instrumentalities comprising a variation of the Qualcomm Snapdragon processors. The Snapdragon processors are coupled to a plurality of sensors including an accelerometer, gyroscope, proximity sensor, infrared light sensor, and ambient light sensor. <table><tr><td>S20</td><td>S21</td><td>S22</td><td>S23</td><td>S24</td><td>S25</td></tr><tr><td>Snapdragon 865</td><td>Snapdragon 888</td><td>Snapdragon 8 Gen 1</td><td>Snapdragon 8 Gen 2</td><td>Snapdragon 8 Gen 3</td><td>Snapdragon 8 Elite</td></tr></table> See https://www.phonearena.com/phones/Samsung-Galaxy-S20_id11266	S20	S21	S22	S23	S24	S25	Snapdragon 865	Snapdragon 888	Snapdragon 8 Gen 1	Snapdragon 8 Gen 2	Snapdragon 8 Gen 3	Snapdragon 8 Elite
S20	S21	S22	S23	S24	S25								
Snapdragon 865	Snapdragon 888	Snapdragon 8 Gen 1	Snapdragon 8 Gen 2	Snapdragon 8 Gen 3	Snapdragon 8 Elite								

https://www.phonearena.com/phones/Samsung-Galaxy-S21_id11508
https://www.phonearena.com/phones/Samsung-Galaxy-S22_id11763
https://www.phonearena.com/phones/Samsung-Galaxy-S23_id11999
https://www.phonearena.com/phones/Samsung-Galaxy-S24_id12113
https://www.phonearena.com/phones/Samsung-Galaxy-S25_id12340

See also Operation Description at sheet 13:

2.1 AP/CP : S5E8825 (EXYNOS1280)

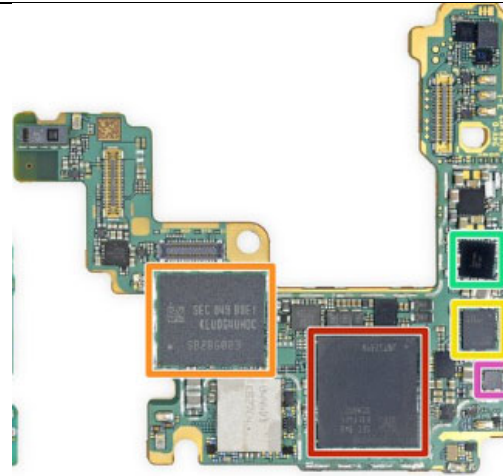
1) Description

S5E8825 is a System-on-Chip (SoC), which is based on a 64-bit RISC processor. It also contains a 5G communication processor (modem), which is compliant with 5G NR features and all legacy features. S5E8825 targets high-end smart phones and tablet products. S5E8825 is based on the 5 nm low-power process and it provides the following features:

- ☐ Octa-core CPU (Dual-core ARM Cortex-A78 (Big CPU), and Hexa-cores ARM Cortex-A55 (Little CPU))
- ☐ 17.1 GB/s of LPDDR4 bandwidth
- ☐ WQHD embedded display
- ☐ 4K 30-frame video decoding (H.264/HEVC) and FHD 30-frame video decoding/encoding hardware (MPEG4/H.263/VP8)
- ☐ 3D graphics H/W
- ☐ Image Signal Processor (ISP)
- ☐ Neural Processing Unit (NPU)
- ☐ ABOX (Audio Sub-System)
- ☐ High-speed interfaces, such as UFS 2.2 and USB 2.0 DRD
- ☐ Embedded communication processor (5G NR FR1 FR2, 4G LTE, 3G FDD/TDD, 2G GSM/CDMA)
- ☐ GNSS and WiFi/BT
- ☐ Context HUB (CHUB)

Accordingly, the Accused Instrumentalities comprise one or more processors (e.g., Qualcomm Snapdragon or Samsung Exynos SoCs) communicatively coupled to one or more sensors

	(including at least accelerometers, gyroscopes, proximity sensors, infrared light sensors, and ambient light sensors).
[11C] at least one steerable antenna communicatively coupled to said one or more processors wherein said at least one steerable antenna is configured to adjust a beam radiation pattern so as to steer or direct its energy in particular directions while providing nulls or dead zones in other directions, wherein said at least one steerable antenna radiates at one or more frequencies in the range of 10 GHz to 500 GHz; and	See claim elements [1C] and [1D] above. Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.
[11D] a non-transitory computer readable medium comprising executable instructions that when executed by said one or more processors cause said one or more processors to perform the steps of:	The Accused Instrumentalities comprise one or more processors and a non-transitory readable medium (e.g., memory) that comprises executable instructions that are executed by the one or more processors. For example, the image below shows an Accused Instrumentality(e.g., Samsung Galaxy S21) comprising a “Qualcomm Snapdragon 888 layered beneath Samsung K3LK4K40CM-BGCP 12 GB LPDDR5 RAM” by the red rectangle on a printed circuit board. The 12 GB LPDDR5 RAM is one or more memory units that store executable instructions that are executed by the processor at runtime.



See <https://www.ifixit.com/Teardown/Samsung+Galaxy+S21+Ultra+Teardown/141188>

In addition, the Accused Instrumentalities include non-volatile UFS storage that stores the operating system and application instructions, which are loaded into RAM for execution.

Accordingly, the Accused Instrumentalities include a non-transitory computer readable medium comprising executable instructions that, when executed by the processor, cause the processor to perform the claimed steps.

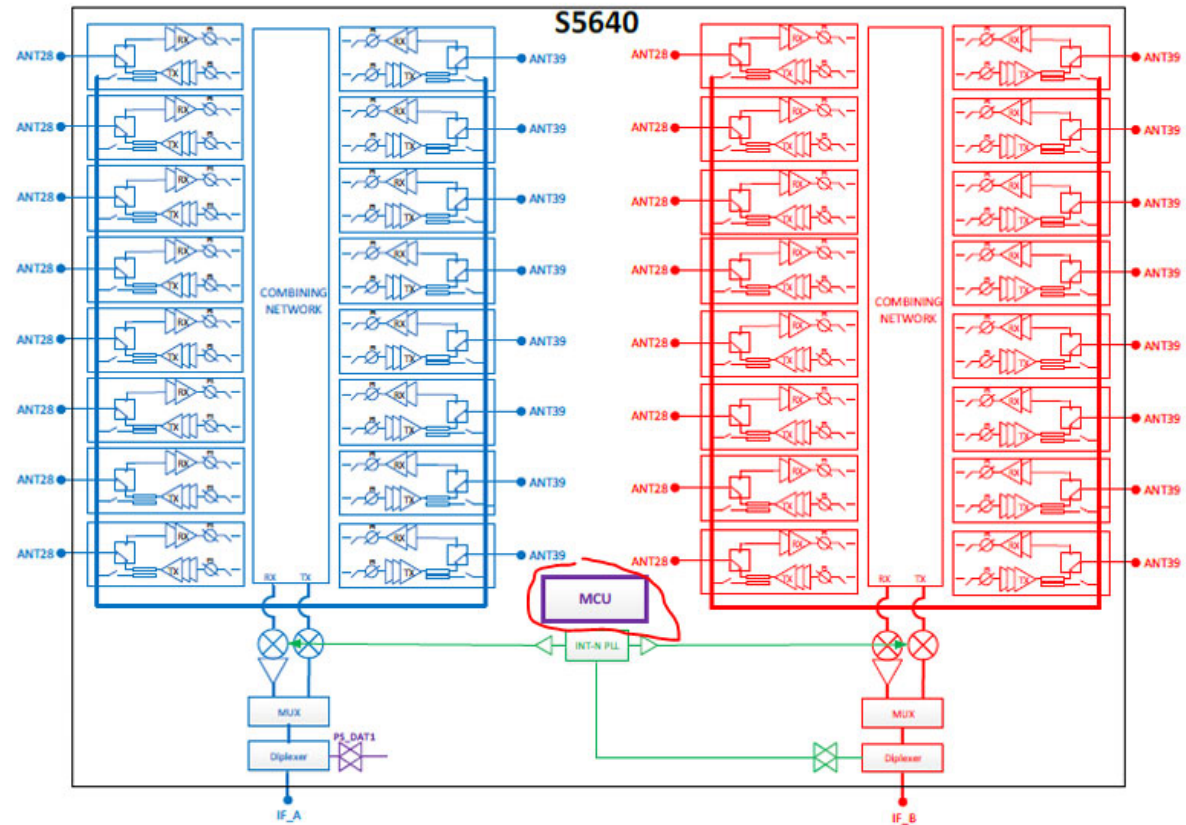
[11E] receiving signals from said one or more sensors pertaining to said orientation in the three dimensional space;

The Accused Instrumentalities comprise a plurality of sensors including an accelerometers, gyroscopes, and proximity sensors in the form of ambient light sensors and/or infrared light sensor that can communicate with the processor to determine the relative orientation of the device and three-dimensional spaces. See claim element [1A] and claim 2 above.

[11F] using said signals, computing zones or spans of directions corresponding with one or more directions of either or both said user and said structure relative to said at least one steerable

See claim element [1B] above. Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.

antenna in the three dimensional space; and	
[11G] adjusting one or more beam radiation patterns of said at least one steerable antenna to radiate in one or more directions of said particular directions which are not in said zones or spans of directions in the three dimensional space,	See element [1C] above. Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.
[11H] wherein said at least one steerable antenna radiates said one or more beams based on signals from said one or more processors determined on execution of said executable instructions, and	The Accused Instrumentalities comprise at least one steerable antenna that is controlled by a microcontroller unit (“MCU”), as shown in the A53 Operational Description. The MCU executes software instructions running on the device processor and, based on those instructions, generates control signals that determine the phase and amplitude settings of the antenna elements. In this way, the steerable antenna radiates beams based on signals from the processors determined on execution of executable instructions.



See claim element [11B] above.

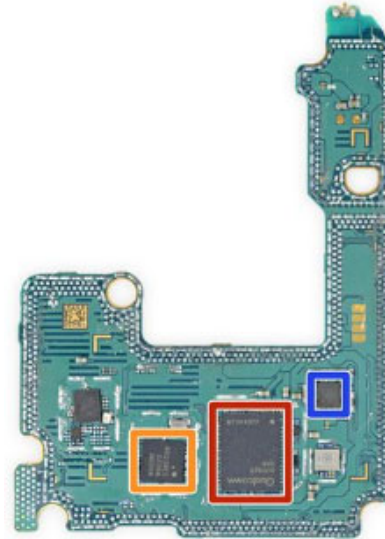
[11I] wherein said at least one steerable antenna operates on one or multiple bands; and

See claim [9] above, which demonstrates that the Accused Instrumentalities' steerable antennas operate on multiple FR2 bands, including n260 (37–40 GHz) and n261 (27.5–28.35 GHz).

[11J] a receiver for receiving over-the-air signals.

The Accused Instrumentalities comprise a receiver for receiving over-the-air signals.

For example, the image below shows an Accused Instrumentality (e.g., Samsung Galaxy S21) comprising a “Qualcomm SDR868 RF transceiver” by the red rectangle on a printed circuit board. The SDR868 RF transceiver is configured to receive over-the-air signals in communication with the antenna modules.

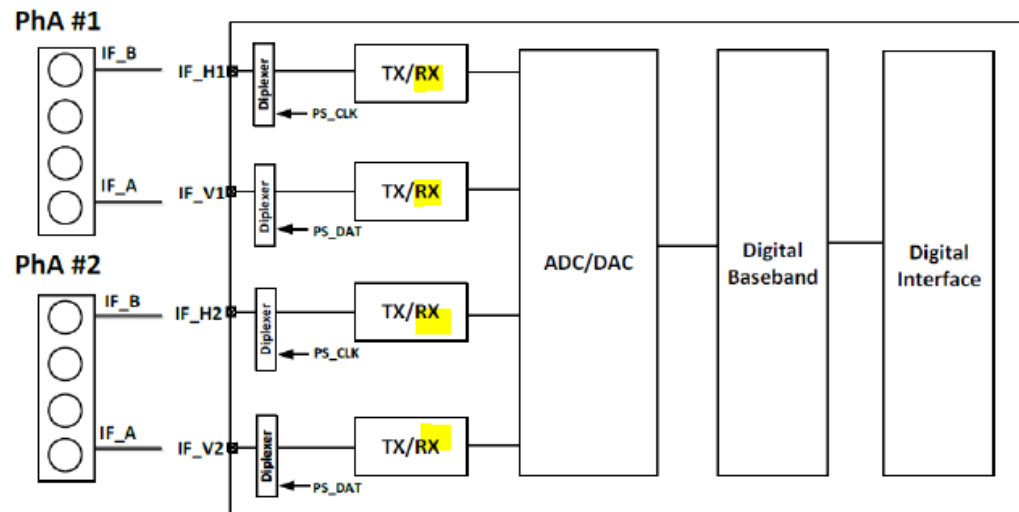


See <https://www.ifixit.com/Teardown/Samsung+Galaxy+S21+Ultra+Teardown/141188>

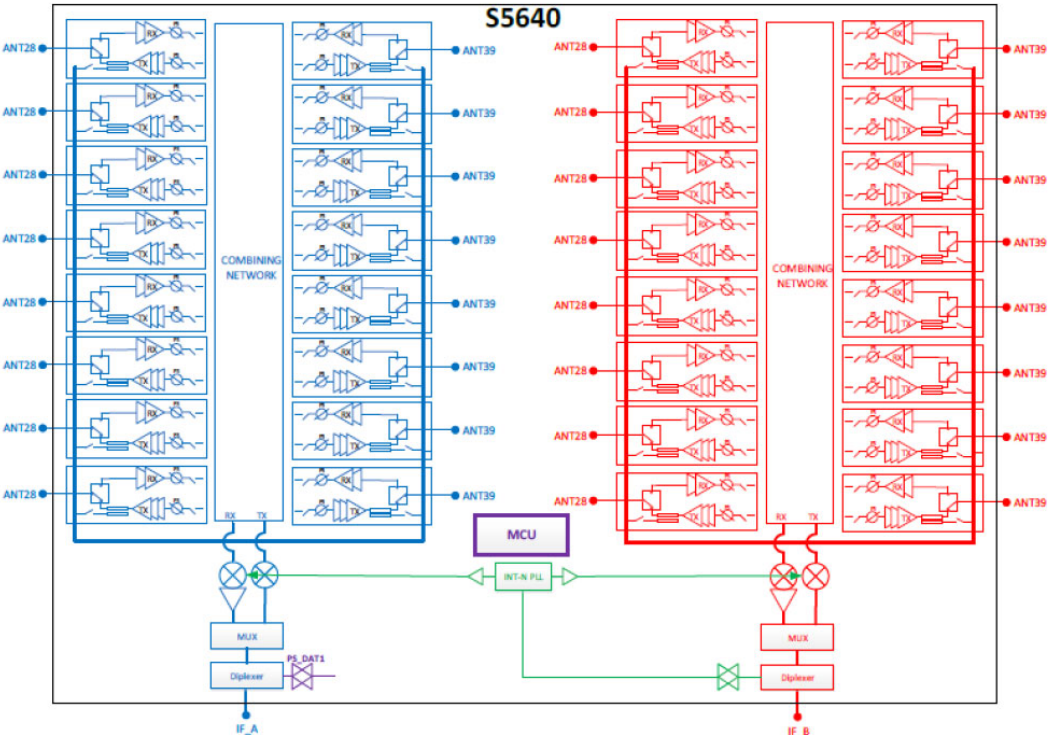
The A53 Operational Description further confirms, at sheet 10, that the S5720 mmWave transceiver includes dedicated RX paths for receiving signals, as shown below:

1.10.2 Chip Block Diagram

The block diagram shows the S5720 internal architecture. It has four IF ports that can connect to two phased array chips, providing two independent IF paths for each, indicated by IF_H and IF_V in the figure. Each IF_V and IF_H pair uses the same LO frequency, but the LO frequency of the two pairs can be different. The chip has **four receiver (Rx)** and four transmitter (Tx) chains. The transmitter chain filters the analog baseband signal coming from the DAC, up-converts it to 9GHz IF with its IQ modulator, and drives it to the RF output through the driver amplifier (DA) and the T/R switch. In the receiver mode, the IF input coming from the phased array chip passes through the diplexer and T/R switch, and gets amplified (if necessary) and then down-converted to the base band using IQ demodulators. The signal is then filtered by low-pass filters in the base band, and sent to ADCs. S5720 controls the phased array modules via PSpeedy interface. PSpeedy requires two signals: reference clock at ~560 MHz, PS_CLK, and control data, PS_DAT at 140MHz. On the IF_H, a diplexer is used to combine 9-GHz IF_H with PS_CLK so that they can be multiplexed over one signal line. Similarly, another diplexer is used on IF_V to combine the IF signal and PS_DAT.



Accordingly, the Accused Instrumentalities include a receiver for receiving over-the-air signals.

Claim 12	Correspondence in Accused Instrumentalities
[12] The wireless device of claim 11, wherein said at least one steerable antenna comprises a plurality of steerable antennas.	According to the A53 Operational Description, the Accused Instrumentalities include a “mmW Antenna Module,” which includes “two separate phased array chips (S5640).” Each phase array chip includes 20 antenna ports: 10 for 28 GHz band and 10 for 39 GHz band. Accordingly, the Accused Instrumentalities include at least one steerable antenna that comprises a plurality of steerable antennas. 
Claim 13	Correspondence in Accused Instrumentalities
[13] The wireless device of claim 11, wherein said one or more	The Accused Instrumentalities include at least light detectors.

sensors includes one or more cameras, gyroscopes, light or motion detectors, capacitive sensors, microphones, and ultrasound sensors or transducers.	See claim element [1A] above.
Claim 17	Correspondence in Accused Instrumentalities
[17] The wireless device of claim 11 wherein said at least one steerable antenna or said receiver uses one or more of: beamforming, beamsteering, beam or antenna element selection, adaptive beamforming, multibeam combining, MIMO, phasing, beam switchable array, active combining, passive combining, and hybrid antenna structure.	See claim 5 above.
Claim 18	Correspondence in Accused Instrumentalities
The wireless device of claim 11, wherein a directional radiating pattern of said one or more beams radiated from said at least one steerable antenna is different from a receiving pattern used by said at least one steerable antenna or said receiver used to receive said over-the-air signals.	See claim 6 above.

Claim 19	Correspondence in Accused Instrumentalities
The wireless device of claim 18 wherein said wireless device is configured for time division duplexing for communication, using said one or more beams radiated by said at least one steerable antenna and using over-the-air signals received by at least one of said at least one steerable antenna or said receiver.	See claim 7 above.
Claim 21	Correspondence in Accused Instrumentalities
[21] The wireless device of claim 11 wherein the at least one steerable antenna operates on multiple bands.	See claim 9 above.
Claim 23	Correspondence in Accused Instrumentalities
[23PRE] A steerable antenna system for avoiding radiation of a user or structure by a wireless device, comprising:	See claim elements [1Pre] and [11PRE] above.
[23A] one or more sensors configured to detect in a three dimensional space using one or more cameras, microphones, audio sensors or transducers, ultrasound sensors, range finders, capacitive	See claim elements [1A] and [11A] above. Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.

sensors, gyroscopes, light detectors, or motion detectors, an orientation of said wireless device relative to either or both said user and said structure;	
[23B] a computation module communicatively coupled to said one or more sensors configured to determine zones or spans of directions;	See claim elements [1B] and [11B] above. Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.
[23C] at least one steerable antenna that radiates at one or more frequencies in the range of 10 GHz to 500 GHz communicatively coupled to said computation module, said at least one steerable antenna being configured for adjustably radiating one or more beams in one or more directions which are not in said zones or spans of directions in the three dimensional space,	See claim elements [1C], [1D] and [11C] above. Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.
[23D] wherein said zones or spans of directions correspond with one or more directions of said user or structure relative to said at least one steerable antenna in the three dimensional space,	See claim elements [1B] and [11F] above. Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.

[23E] wherein said at least one steerable antenna is configured to adjustably steer or direct its energy in particular directions while providing nulls or dead zones in other directions in the three dimensional space,	See claim elements [1C] and [11G] above. Plaintiff contends that this element is literally present in the Accused Instrumentalities. To the extent that this element is found not to be literally present, Plaintiff contends in the alternative that the element is present under the doctrine of equivalents because any differences are insubstantial, the Accused Instrumentalities perform substantially the same function in substantially the same way to achieve substantially the same result, and/or the differences are otherwise insubstantial under controlling law.
[23F] wherein said at least one steerable antenna operates on one or multiple bands; and	See claim elements [1D] and [11H] above.
[23G] a receiver for receiving signals.	See claim element [11J] above.
Claim 25	Correspondence in Accused Instrumentalities
The steerable antenna device of claim 23, wherein said one or more sensors includes one or more cameras, gyroscopes, light or motion detectors, capacitive sensors, microphones, and ultrasound transducers.	See claim element [1A] above, and claims 2 and 13 above.
Claim 27	Correspondence in Accused Instrumentalities
The steerable antenna system of claim 23 wherein a directional radiating pattern of said one or more beams radiated from said at least one steerable antenna is different from a receiving pattern	See claim 6 above.

of said at least one steerable antenna.	
Claim 29	Correspondence in Accused Instrumentalities
The steerable antenna system of claim 23 wherein said at least one steerable antenna or said receiver uses one or more of: beamforming, beamsteering, beam or antenna element selection, adaptive beamforming, multibeam combining, MIMO, phasing, beam switchable array, active combining, passive combining, and hybrid antenna structure.	See claim 5 above.
Claim 30	Correspondence in Accused Instrumentalities
The steerable antenna system of claim 23, wherein a directional radiating pattern of said one or more beams radiated from said at least one steerable antenna is different from a receiving pattern used by said at least one steerable antenna or said receiver.	See claim 6 above.
Claim 31	Correspondence in Accused Instrumentalities
The steerable antenna system of claim 30 wherein the steerable antenna system is configured for time division duplexing for	See claim 7 above.

communication, using said one or more beams radiated by said at least one steerable antenna and signals received by at least one of said at least one steerable antenna or said receiver.	
Claim 33	Correspondence in Accused Instrumentalities
The steerable antenna system of claim 23 wherein the at least one steerable antenna operates on multiple bands.	See claim elements [1D] and [11I] above, and claims 9 and 21 above.