

Phillips Connect StealthNet

Infringement where the main antenna is considered the first antenna

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1

Geotab Exhibit 1055
Geotab v. Fractus

~~CONFIDENTIAL - PROTECTIVE ORDER MATERIAL~~

US 11,349,200 - Phillips Connect StealthNet

Claim 11

[11-preamble] A wireless device comprising:

[11-preamble] Wireless device

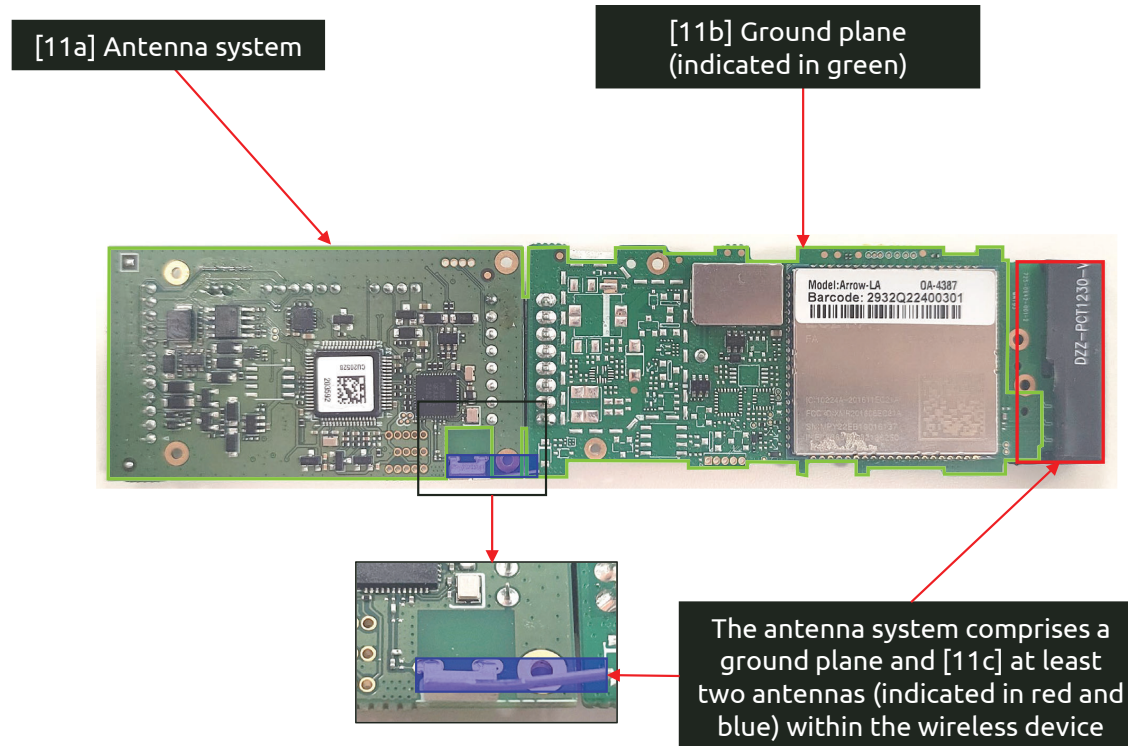


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Claim 11

[11a] an antenna system comprising
[11b] a ground plane and
and
[11c] at least two antennas within the wireless device, the antenna system comprising:



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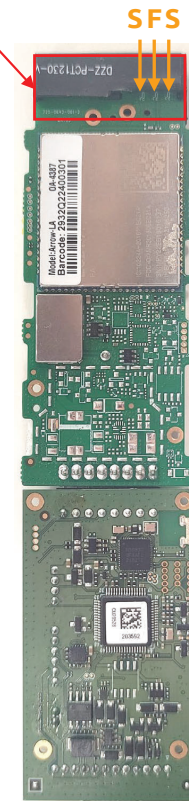
Claim 11

[11d] a first antenna configured to provide operation in at least three frequency bands being used by 4G communication standards,

[11d] The antenna system comprises a first antenna (indicated in red) configured to provide operation in at least LTE 700(B12)/1700-2100(B4)/1900(B2)

LTE Cat 1	EC21-A
Region/Operator	North America
Dimensions (mm)	29.0 x 32.0 x 2.4
Temperature Range	
Operation Temperature	-35 °C to +75 °C
Extended Temperature	-40 °C to +85 °C
Frequency Bands	
LTE-FDD	B2/4/12
LTE-TDD	-
WCDMA	B2/4/5
GSM/EDGE	-
GNSS (Optional)	GPS/GLONASS/BDS/Galileo/QZSS

Source: Cellular module datasheet



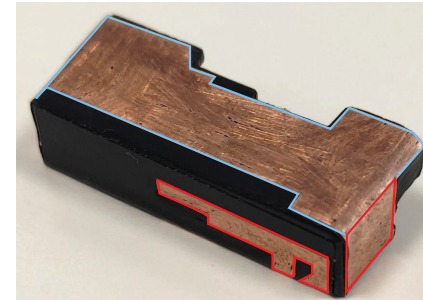
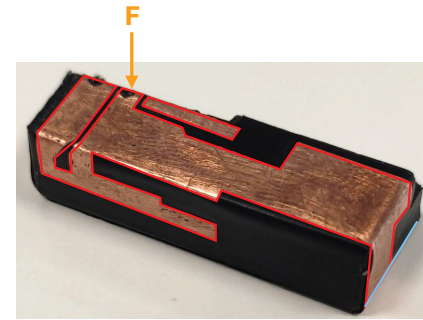
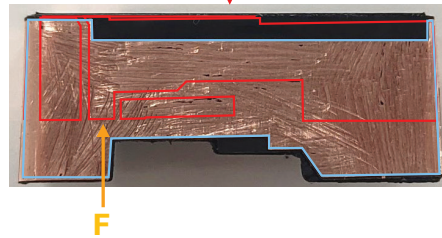
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Claim 11

[11e] the first antenna defining an antenna contour comprising an entire perimeter of the first antenna,

[11e] The first antenna defines an antenna contour (indicated in blue and red) comprising an entire perimeter of the first antenna

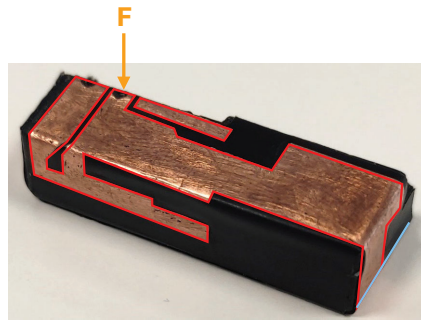


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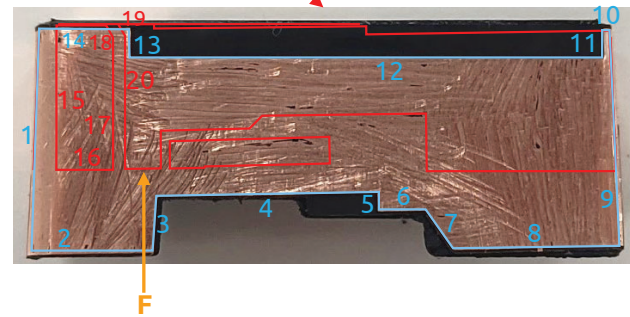
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Claim 11

[11f] the antenna contour comprising at least twenty segments,



[11f] The antenna contour comprises at least 20 segments



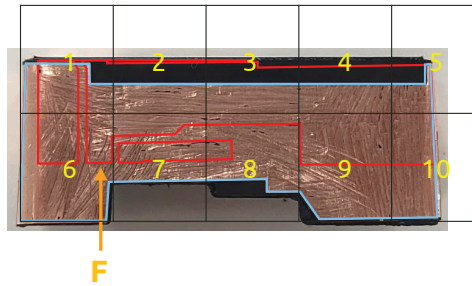
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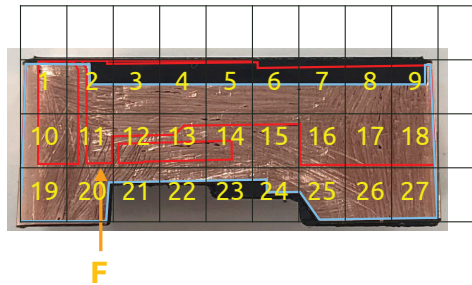
Claim 11

[11g] wherein the antenna contour has a level of complexity defined by complexity factor F_{21} having a value of at least 1.20 and

[11g] The antenna contour has a level of complexity defined by complexity factor F_{21} having a value of at least 1.20



$N_1 = 10$ cells



$N_2 = 27$ cells

$$F_{21} = -\frac{\log(N_2) - \log(N_1)}{\log(1/2)} = -\frac{\log(27) - \log(10)}{\log(1/2)} = 1.43 \geq 1.20$$

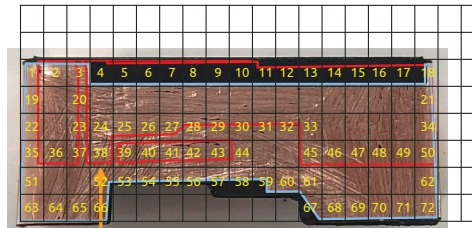
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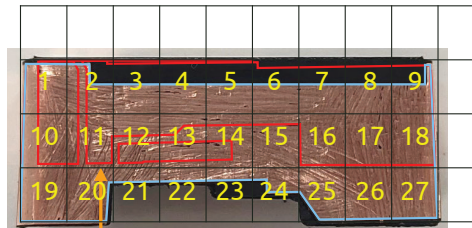
Claim 11

[11h] complexity factor F_{32} having a value of at least 1.35, and

[11h] The antenna contour has a level of complexity defined by complexity factor F_{32} having a value of at least 1.35



$N_3 = 72$ cells



$N_2 = 27$ cells

$$F_{32} = -\frac{\log(N_3) - \log(N_2)}{\log(1/2)} = -\frac{\log(72) - \log(27)}{\log(1/2)} = 1.42 \geq 1.35$$

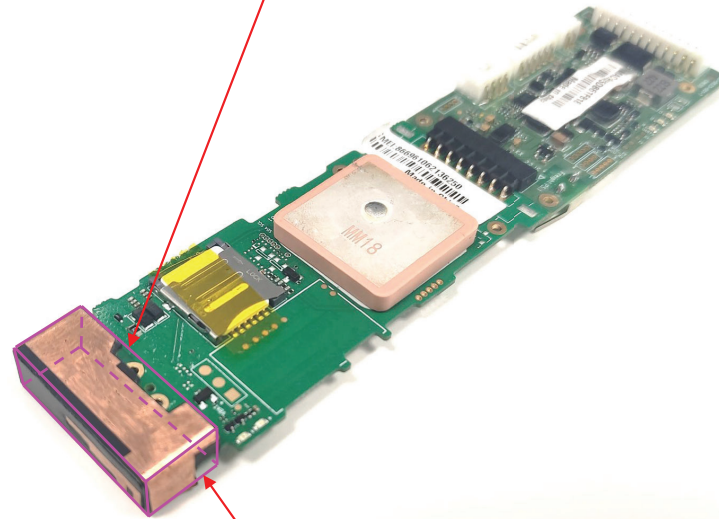
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Claim 11

[11i] wherein the first antenna defines an antenna box that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna and
[11j] wherein each face of the minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna,

[11i] The first antenna defines an antenna box (outlined in pink) that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna



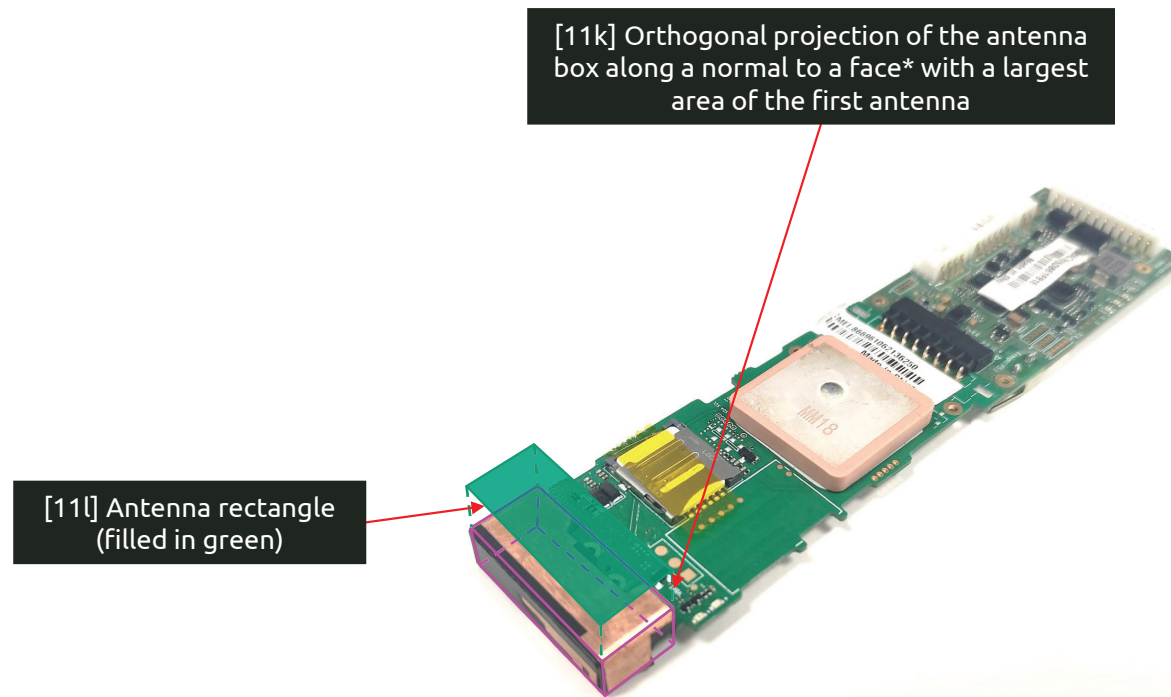
[11j] Each face of the minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna

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Claim 11

[11k] an orthogonal projection of the antenna box along a normal to a face with a largest area of the first antenna defining [11l] an antenna rectangle,



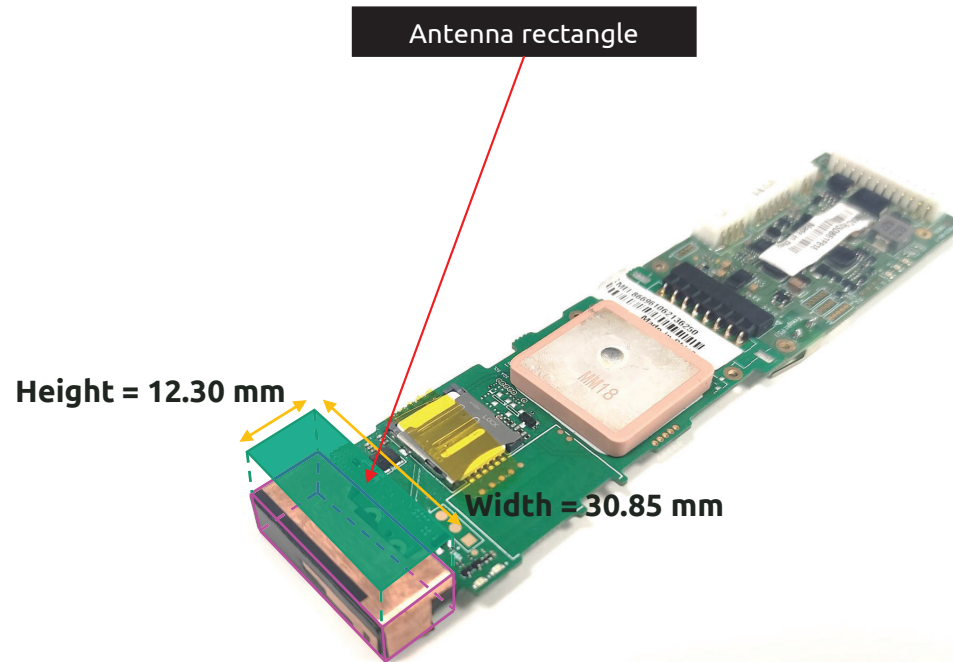
*Normal to a face means perpendicular to the face

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Claim 11

[11m] an aspect ratio of the antenna rectangle being defined as a ratio between a width and a height of the antenna rectangle, wherein the aspect ratio has a value of at least 2; and



[11m] Aspect ratio of the antenna rectangle = $30.85/12.30 = 2.51 \geq 2$

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Claim 11

[11n] a second antenna configured to provide operation in a first wireless service, [11o] the second antenna being proximate to a side of a ground plane rectangle enclosing the ground plane.

[11n] The antenna system comprises a second antenna (indicated in blue) is configured to provide operation in at least Bluetooth, and [11o] is proximate to a side of a ground plane rectangle (indicated with a dashed green line) enclosing the ground plane

CELLULAR TECHNOLOGY

LTE Cat 1
Integrated high sensitivity antenna
Auto register to packet network

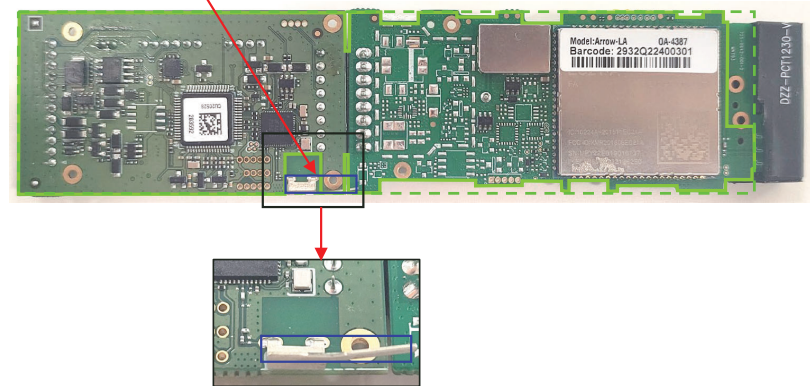
GPS FUNCTIONALITY

Channels: 56
Tracking Sensitivity: -162 dBm
Acquisition Sensitivity: -148 dBm
Location Accuracy: 2.5 CEP

BLUETOOTH

Low Energy (BLE)
Version 4.2

Source: Brochure



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Claim 15

[15a] The wireless device of claim 11, wherein the antenna system comprises a third antenna.

[15a] The antenna system comprises a third antenna, GPS antenna



CELLULAR TECHNOLOGY

LTE Cat 1
Integrated high sensitivity antenna
Auto register to packet network

GPS FUNCTIONALITY

Channels: 56
Tracking Sensitivity: -162 dBm
Acquisition Sensitivity: -148 dBm
Location Accuracy: 2.5 CEP

BLUETOOTH

Low Energy (BLE)
Version 4.2

Source: Brochure

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Claim 17

[17a] The wireless device of claim 15, wherein the third antenna is configured to provide operation in a second wireless service.

[17a] The third antenna is configured to provide operation in a second wireless service, GPS



CELLULAR TECHNOLOGY

LTE Cat 1
Integrated high sensitivity antenna
Auto register to packet network

GPS FUNCTIONALITY

Channels: 56
Tracking Sensitivity: -162 dBm
Acquisition Sensitivity: -148 dBm
Location Accuracy: 2.5 CEP

BLUETOOTH

Low Energy (BLE)
Version 4.2

Source: Brochure

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