

22nd August 2013

Telecommunication Certification Body
 UL VS Ltd
 Pavilion A
 Ashwood Park
 Basingstoke
 Hampshire
 RG23 8BG
 United Kingdom

Subject: Test Rationale

Application for FCC ID: QWP-50650

Applicant: Cambium Networks Ltd

Dear Examiner,

In accordance with the requirements of Part 15.204 (c)(2) Cambium Networks confirm that the test program which was carried out employed the highest gain antenna of each type supported by the PTP 50650.

The antenna types and gains used during the certification test are given in Table 1, Table 2 to Table 5 lists the antennas of each Type identified with Manufacturers Antenna Gain which, as required by Part 15.204 (c)(4), are of the same type with equal or less gain than the antenna gain used for test.

| Antenna Type | Manufacturers Gain (dBi) | | | Antennas submitted for Certification with the PTP 50650 |
|-------------------|--------------------------|---------------|-----------|---|
| | Bottom Band | Middle Band | High Band | |
| 6' Parabolic Dish | 36.0 | Not Supported | 38.1 | Table 2: Parabolic Antennas |
| 4' Parabolic Dish | 32.6 | 34.9 | 35.3 | Table 2: Parabolic Antennas |
| Flat Plate | 23.0 | 23.0 | 23.0 | Table 3: microStrip (Flat Plate) Antennas |
| Sectorised | 17.0 | 17.0 | 17.0 | Table 4: Sectorized Antennas |
| OMNI | 13.0 | 13.0 | 13.0 | Table 5: OMNI Antennas |

Table 1: Antenna Types and Gains proposed for Certification

Sincerely yours,



Donald W Reid
 Senior Regulatory Engineer
 Cambium Networks Ltd



Table 2: Parabolic Antennas supported by PTP 50650

| Frequency Band | Manufacturer | Antenna Type | Nom Gain (dBi) | Parabolic Dish | Cambium Part Number |
|----------------|---------------|--|----------------|----------------|---------------------|
| 5.8 | StellaDoradus | StellaDoradus 2-foot Single-Pol, 56 PSD61 | 27 | Y | |
| 5.2/5.4 | StellaDoradus | StellaDoradus 2-foot Single-Pol, 56 PSD61 | 27 | Y | |
| 5.8 | RFS | RFS 2-foot Parabolic, SPF2-52AN | 27.9 | Y | |
| 5.2/5.4 | RFS | RFS 2-foot Parabolic, SPF2-52AN | 27.9 | Y | |
| 5.8 | Gabriel | Gabriel 2-foot High Performance Dual QuickFire Parabolic, HQFD2-52-N | 28.1 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 2-foot High Performance Dual QuickFire Parabolic, HQFD2-52-N | 28.1 | Y | |
| 5.8 | RadioWaves | Radio Waves 2-foot Dual-Pol Parabolic, SPD2-5.2 | 28.1 | Y | RDH4503B |
| 5.2/5.4 | RadioWaves | Radio Waves 2-foot Dual-Pol Parabolic, SPD2-5.2 | 28.1 | Y | RDH4503B |
| 5.8 | Gabriel | Gabriel 2-foot High Performance QuickFire Parabolic, HQF2-52-N | 28.2 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 2-foot High Performance QuickFire Parabolic, HQF2-52-N | 28.2 | Y | |
| 5.8 | RadioWaves | Radio Waves 2-foot Parabolic, SP2-2/5 | 28.3 | Y | |
| 5.8 | Gabriel | Gabriel 2-foot Standard Dual QuickFire Parabolic, QFD2-52-N | 28.4 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 2-foot Standard Dual QuickFire Parabolic, QFD2-52-N | 28.4 | Y | |
| 5.8 | Gabriel | Gabriel 2-foot Standard Dual QuickFire Parabolic, QFD2-52-N-RK | 28.4 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 2-foot Standard Dual QuickFire Parabolic, QFD2-52-N-RK | 28.4 | Y | |
| 5.8 | Gabriel | Gabriel 2-foot Standard QuickFire Parabolic, QF2-52-N | 28.5 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 2-foot Standard QuickFire Parabolic, QF2-52-N | 28.5 | Y | |
| 5.8 | Gabriel | Gabriel 2-foot Standard QuickFire Parabolic, QF2-52-N-RK | 28.5 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 2-foot Standard QuickFire Parabolic, QF2-52-N-RK | 28.5 | Y | |
| 5.8 | MTI | MTI 2-foot Dual-Pol, MT-486013/N | 28.5 | Y | |
| 5.2/5.4 | MTI | MTI 2-foot Dual-Pol, MT-486013/N | 28.5 | Y | |
| 5.8 | MTI | MTI 2-foot Single-Pol, MT-466009/N | 28.5 | Y | |
| 5.2/5.4 | MTI | MTI 2-foot Single-Pol, MT-466009/N | 28.5 | Y | |
| 5.8 | RadioWaves | Radio Waves 2-foot Dual-Pol Parabolic, HPD2-5.2NS | 28.8 | Y | RDH4508B |
| 5.2/5.4 | RadioWaves | Radio Waves 2-foot Dual-Pol Parabolic, HPD2-5.2NS | 28.8 | Y | RDH4508B |
| 5.8 | MTI | MTI 3-foot Single-Pol, MT-487000/N | 29 | Y | |
| 5.2/5.4 | MTI | MTI 3-foot Single-Pol, MT-487000/N | 29 | Y | |

| Frequency Band | Manufacturer | Antenna Type | Nom Gain (dBi) | Parabolic Dish | Cambium Part Number |
|----------------|---------------|--|----------------|----------------|---------------------|
| 5.8 | RadioWaves | Radio Waves 2-foot Parabolic, SP2-5.2 | 29 | Y | |
| 5.2/5.4 | RadioWaves | Radio Waves 2-foot Parabolic, SP2-5.2 | 29 | Y | |
| 5.8 | Andrew | Andrew 2-foot Dual-Pol Parabolic, PX2F-52 | 29.4 | Y | |
| 5.2/5.4 | Andrew | Andrew 2-foot Dual-Pol Parabolic, PX2F-52 | 29.4 | Y | |
| 5.8 | Andrew | Andrew 2-foot Parabolic, P2F-52 | 29.4 | Y | |
| 5.2/5.4 | Andrew | Andrew 2-foot Parabolic, P2F-52 | 29.4 | Y | |
| 5.8 | Gabriel | Gabriel 2.5-foot Standard Dual QuickFire Parabolic, QFD2.5-52-N | 31.1 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 2.5-foot Standard Dual QuickFire Parabolic, QFD2.5-52-N | 31.1 | Y | |
| 5.2/5.4 | RadioWaves | Radio Waves 3-foot Dual-Pol Parabolic, SPD3-5.2 | 31.1 | Y | RDH4504B |
| 5.8 | RadioWaves | Radio Waves 3-foot Dual-Pol Parabolic, SPD3-5.2 | 31.1 | Y | RDH4504B |
| 5.8 | Gabriel | Gabriel 2.5-foot Standard QuickFire Parabolic, QF2.5-52-N | 31.2 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 2.5-foot Standard QuickFire Parabolic, QF2.5-52-N | 31.2 | Y | |
| 5.8 | RadioWaves | Radio Waves 3-foot Parabolic, SP3-2/5 | 31.4 | Y | |
| 5.2/5.4 | RadioWaves | Radio Waves 3-foot Parabolic, SP3-5.2 | 31.4 | Y | RDH4513B |
| 5.8 | RadioWaves | Radio Waves 3-foot Parabolic, SP3-5.2 | 31.4 | Y | RDH4513B |
| 5.8 | RadioWaves | Radio Waves 3-foot Dual-Pol Parabolic, HPD3-5.2NS | 32.3 | Y | RDH4509B |
| 5.2/5.4 | RadioWaves | Radio Waves 3-foot Dual-Pol Parabolic, HPD3-5.2NS | 32.3 | Y | RDH4509B |
| 5.8 | StellaDoradus | StellaDoradus 4-foot Single-Pol, 56 PSD113 | 32.4 | Y | |
| 5.2/5.4 | StellaDoradus | StellaDoradus 4-foot Single-Pol, 56 PSD113 | 32.4 | Y | |
| 5.8 | Andrew | Andrew 3-foot Dual-Pol Parabolic, PX3F-52 | 33.4 | Y | |
| 5.2/5.4 | Andrew | Andrew 3-foot Dual-Pol Parabolic, PX3F-52 | 33.4 | Y | |
| 5.8 | Andrew | Andrew 3-foot Parabolic, P3F-52 | 33.4 | Y | |
| 5.2/5.4 | Andrew | Andrew 3-foot Parabolic, P3F-52 | 33.4 | Y | |
| 5.8 | RFS | RFS 4-foot HP Parabolic, SDF4-52AN | 33.9 | Y | |
| 5.2/5.4 | RFS | RFS 4-foot HP Parabolic, SDF4-52AN | 33.9 | Y | |
| 5.2/5.4 | RFS | RFS 4-foot Parabolic, SPF4-52AN | 33.9 | Y | |
| 5.8 | RFS | RFS 4-foot Parabolic, SPF4-52AN | 33.9 | Y | |
| 5.8 | Gabriel | Gabriel 4-foot High Performance Dual QuickFire Parabolic, HQFD4-52-N | 34.3 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 4-foot High Performance Dual QuickFire Parabolic, HQFD4-52-N | 34.3 | Y | |

| Frequency Band | Manufacturer | Antenna Type | Nom Gain (dBi) | Parabolic Dish | Cambium Part Number |
|----------------|--------------|--|----------------|----------------|---------------------|
| 5.8 | Gabriel | Gabriel 4-foot High Performance QuickFire Parabolic, HQF4-52-N | 34.4 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 4-foot High Performance QuickFire Parabolic, HQF4-52-N | 34.4 | Y | |
| 5.8 | RadioWaves | Radio Waves 4-foot Dual-Pol Parabolic, SPD4-5.2 | 34.4 | Y | RDH4505B |
| 5.2/5.4 | RadioWaves | Radio Waves 4-foot Dual-Pol Parabolic, SPD4-5.2 | 34.4 | Y | RDH4505B |
| 5.8 | RadioWaves | Radio Waves 4-foot Parabolic, SP4-2/5 | 34.6 | Y | |
| 5.8 | Gabriel | Gabriel 4-foot Standard Dual QuickFire Parabolic, QFD4-52-N | 34.7 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 4-foot Standard Dual QuickFire Parabolic, QFD4-52-N | 34.7 | Y | |
| 5.8 | Gabriel | Gabriel 4-foot Standard Dual QuickFire Parabolic, QFD4-52-N-RK | 34.7 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 4-foot Standard Dual QuickFire Parabolic, QFD4-52-N-RK | 34.7 | Y | |
| 5.8 | RadioWaves | Radio Waves 4-foot Dual-Pol Parabolic, HPD4-5.2NS | 34.7 | Y | RDH4510B |
| 5.2/5.4 | RadioWaves | Radio Waves 4-foot Dual-Pol Parabolic, HPD4-5.2NS | 34.7 | Y | RDH4510B |
| 5.8 | Gabriel | Gabriel 4-foot Standard QuickFire Parabolic, QF4-52-N | 34.8 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 4-foot Standard QuickFire Parabolic, QF4-52-N | 34.8 | Y | |
| 5.8 | Gabriel | Gabriel 4-foot Standard QuickFire Parabolic, QF4-52-N-RK | 34.8 | Y | |
| 5.2/5.4 | Gabriel | Gabriel 4-foot Standard QuickFire Parabolic, QF4-52-N-RK | 34.8 | Y | |
| 5.8 | RadioWaves | Radio Waves 4-foot Parabolic, SP4-5.2 | 34.8 | Y | |
| 5.2/5.4 | RadioWaves | Radio Waves 4-foot Parabolic, SP4-5.2 | 34.8 | Y | |
| 5.8 | Andrew | Andrew 4-foot Dual-Pol Parabolic, PX4F-52 | 34.9 | Y | RDG4453B |
| 5.2/5.4 | Andrew | Andrew 4-foot Dual-Pol Parabolic, PX4F-52 | 34.9 | Y | RDG4453B |
| 5.8 | Andrew | Andrew 4-foot Parabolic, P4F-52 | 34.9 | Y | RDH4524A |
| 5.2/5.4 | Andrew | Andrew 4-foot Parabolic, P4F-52 | 34.9 | Y | RDH4524A |
| 5.8 | Gabriel | Gabriel 6-foot High Performance Dual QuickFire Parabolic, HQFD6-52-N | 37.3 | Y | |
| 5.8 | Gabriel | Gabriel 6-foot High Performance QuickFire Parabolic, HQF6-52-N | 37.4 | Y | |
| 5.8 | RFS | RFS 6-foot HP Parabolic, SDF6-52AN | 37.4 | Y | |
| 5.8 | RFS | RFS 6-foot Parabolic, SPF6-52AN | 37.4 | Y | |
| 5.8 | RadioWaves | Radio Waves 6-foot Dual-Pol Parabolic, SPD6-5.2 | 37.5 | Y | RDH4506B |
| 5.8 | Andrew | Andrew 6-foot Dual-Pol Parabolic, PX6F-52 | 37.6 | Y | |
| 5.8 | Andrew | Andrew 6-foot Parabolic, P6F-52 | 37.6 | Y | RDH4525A |
| 5.8 | Gabriel | Gabriel 6-foot Standard Dual QuickFire Parabolic, QFD6-52-N | 37.7 | Y | |
| 5.8 | Gabriel | Gabriel 6-foot Standard QuickFire Parabolic, QF6-52-N | 37.7 | Y | |

| Frequency Band | Manufacturer | Antenna Type | Nom Gain (dBi) | Parabolic Dish | Cambium Part Number |
|----------------|--------------|---|----------------|----------------|---------------------|
| 5.8 | RadioWaves | Radio Waves 6-foot Dual-Pol Parabolic, HPD6-5.2NS | 37.7 | Y | RDH4511B |
| 5.8 | RadioWaves | Radio Waves 6-foot Parabolic, SP6-2/5 | 37.7 | Y | |
| 5.8 | RadioWaves | Radio Waves 6-foot Parabolic, SP6-5.2 | 37.7 | Y | |

Table 3: microStrip (Flat Plate) Antennas Supported by PTP 50650

| Frequency Band | Manufacturer | Antenna Type | Nom Gain (dBi) | Parabolic Dish | Cambium Part Number |
|----------------|--------------|---|----------------|----------------|------------------------------|
| 5.8 | MARS | Small Form Factor Flat Plate Antenna Part # MA-EM56-DP19CM. | 19 | N | Integrated Small Form Factor |
| 5.2/5.4 | MARS | Small Form Factor Flat Plate Antenna Part # MA-EM56-DP19CM. | 19 | N | Integrated Small Form Factor |
| 5.8 | Andrew | Andrew 1.25-foot Flat Panel Dual, UBXP375-4-1 | 21 | N | |
| 5.2/5.4 | Andrew | Andrew 1.25-foot Flat Panel Dual, UBXP375-4-1 | 21 | N | |
| 5.8 | Andrew | Andrew 1-foot Flat Panel Single, UBP300-4-1 | 21 | N | |
| 5.2/5.4 | Andrew | Andrew 1-foot Flat Panel Single, UBP300-4-1 | 21 | N | |
| 5.8 | MARS | MA-WS54-50R Flat Plate (Dual-Pol) | 23 | N | Integrated |
| 5.2/5.4 | MARS | MA-WS54-50R Flat Plate (Dual-Pol) | 23 | N | Integrated |
| 5.8 | MTI | MTI 15 inch Dual-Pol Flat Panel, MT-485025/NVH | 23 | N | |
| 5.2/5.4 | MTI | MTI 15 inch Dual-Pol Flat Panel, MT-485025/NVH | 23 | N | |
| 5.8 | RFS | RFS 1-foot Flat Panel, MA0528-23AN | 23 | N | |

Note: MARS microStrip (Flat Plate) Antennas listed in Table 3 are integrated antennas not connectorized

Table 4: Sectorized Antennas Supported by PTP 50650

| Frequency Band | Manufacturer | Antenna Type | Nom Gain (dBi) | Parabolic Dish | Cambium Part Number |
|----------------|--------------|--------------------------|----------------|----------------|---------------------|
| 5.2/5.4 | Laird | 60 Sectorized (Dual-Pol) | 17 | N | |
| 5.8 | Laird | 60 Sectorized (Dual-Pol) | 17 | N | |
| 5.8 | Laird | 90 Sectorized (Dual-Pol) | 17 | N | |
| 5.2/5.4 | Laird | 90 Sectorized (Dual-Pol) | 17 | N | |

Table 5: OMNI Antennas Supported by PTP 50650

| Frequency Band | Manufacturer | Antenna Type | Nom Gain (dBi) | Parabolic Dish | Cambium Part Number |
|----------------|--------------|-----------------|----------------|----------------|---------------------|
| 5.8 | KPPA | OMNI (Dual-Pol) | 13 | N | |
| 5.2/5.4 | KPPA | OMNI (Dual-Pol) | 13 | N | |