

Nokia Solutions and Network, OY
2000 W. Lucent Lane,
Naperville, IL 60563

Timco Engineering Inc.
FCC Authorized
Telecommunication Certification Body (TCB)
849 N.W. State Road 45
P.O. Box 370
Newberry, Florida 32669

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Subject: Application for C2PC Equipment Authorization under FCC ID: 2AD8UAZRBRH1 for Nokia Low Power AirScale Micro LAA RRH with New BA-AIO3O3T3T3VJX65F-06 and PAS2457-CC1 Antennas and 4x20MHz Carriers Configuration, Operating in the Band 46 UNII-1/2/3 Bands

Dear Examiner:

The Nokia AirScale Micro Remote Radio Head (RRH) (hereinafter referred to as “AZRB”) is a low power RRH operating in the Band 46 unlicensed spectrum of 5.18-5.24 GHz (UNII-1), 5.26-5.32 & 5.5-5.72 (UNII-2) and 5.745-5.825 MHz (UNII-3) under the regulations of FCC Title 47 Part 15 Subpart E, Unlicensed National Information Infrastructure (UNII) Devices. The AZRB received its initial FCC certification on April 25, 2018 under FCC ID: 2AD8UAZRBRH1 and three following C2PC authorizations for operation in the UNII-1, UNII-2 and UNII-3 frequency spectrums as a Point-to-Multipoint Master Device with one to three 20MHz carriers with (aggregated) bandwidth of 20/40/60MHz.

The AZRB supports LTE (Long Term Evolution) License Assisted Access (LAA) technology and a maximum RF power of 0.5W at each of its two MIMO transmit ports.

The new changes are to add 1) two new directional antennas, BA-AIO3O3T3T3VJX65F-06 and PAS2457-CC1, and 2) 4x20MHz carrier configuration with (aggregated) bandwidth of 80MHz. There are no changes on the maximum total power output at the antenna ports, the software and the hardware of AZRB. There are no modifications in the transmitting and receiving frequency ranges.

In the original certification and three following C2P2 filings, four omni-directional antennas with the maximum gain of 7.5 dBi and three directional antennas with the maximum gain of 9.5dBi have been approved. Now two new directional antennas, BA-AIO3O3T3T3VJX65F-06 has a gain of 9.5 dBi and PAS2457-CC1 has a gain of 10.5dBi. Both BA-AIO3O3T3T3VJX65F-06 antenna and PAS2457-CC1 antenna are connected to the AZRB RF transmitter connectors through a 1:3 splitter and feedline(s) which has a total loss no more than 6.5dB for BA-AIO3O3T3T3VJX65F-06 antenna and no more than 8.5dB for PAS2457-CC1 Antenna, respectively. Since the total RF conducted output power of AZRB is capped at 30dBm (1W), the pathloss from the splitter and feedlines reduces its antenna effective gain and/or output power to make the total maximum EIRP below 34dBm, lower than 36dBm total maximum EIRP approved with the existing antennas. Although the effective antenna gain of both BA-AIO3O3T3T3VJX65F-06 and PAS2457-CC1 antennas are lower than 9.5dBi, the gain of the directional antenna, 2205, authorized previously, the configurations of AZRB with BA-AIO3O3T3T3VJX65F-06 and PAS2457-CC1 antennas are new. In addition, in UNII-2 band, their effective antenna gains are lower than the lowest antenna gain evaluated and authorized for AZRB DFS performance.

Per KDB 353028 D01 (Guidance for Antennas Used with Part 15 Intentional Radiators) Section III.L, in cases where the antenna is permanently attached to the cable, or if the antenna is professionally installed, the cable loss can be

subtracted from the output power at the transmitter terminal to calculate the output power at the antenna input for determining compliance with the output power and any EIRP limit for the antenna. In such a case, the output power at the transmitter terminal, the cable loss, and the output power at the antenna must all be documented in the test report. The grant must list the output power at the antenna, and which cannot exceed the applicable limit. Per KDB 178919 D01 (Permissive Change Policy) Section II.A, the addition of a lower gain antenna, of the type currently authorized or not, requires a Class II permissive change, because the lowest gain results in worst case radar reception.

Therefore, a Class II permissive authorization is requested for adding 1) BA-AIO3O3T3T3VJX65F-06 and PAS2457-CC1 antennas due to new configuration and lower “effective” antenna gain in UNII-2 band and 2) 4x20MHz configuration under the existing FCC ID 2AD8UAZRBRH1. Per FCC 2.1041(a), the technical requirements specified in FCC 15 Subpart E Section 15.407 needs to be met. Per 2.1043(b)(2), when a Class II permissive change is made by the grantee, the grantee shall provide complete information and the results of tests of the characteristics affected by such change. Therefore, only the technical requirements in 15.407 affected were evaluated. The guidelines and guidance provided in the KDB 789033 D02 v02r01 (Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices, Part 15, Subpart E), KDB 905462 D02 and ANSI C63.10-2013 were followed for measurement procedures and methods.

Enclosed in this application package are FCC 731 Form, the required measurement data and other required exhibits specific to this request for authorization of the subject product. The measurement exhibits attached to this application demonstrate full compliance with FCC Part 15.407 following the procedural requirements specified in FCC Part 2 Subpart J – Equipment Authorization Procedures.

The key data are summarized below.

FCC ID:	2AD8UAZRBRH1
FCC Rules:	Part 15 Subpart E Section 15.407 – UNII Devices
Frequency Range:	E-UTRAN Band 46, 5.17-5.25GHz (UNII-1), 5250-5350 MHz (UNII-2a); 5470-5725 MHz (UNII-2c), & 5.735-5.835 GHz (UNII-3)
Output Power:	Up to 1W
Operation Mode:	Master Device, Point to Multipoint
Carriers:	1~4 20MHz Carriers with (Aggregated) Bandwidth 20/40/60/80MHz
Changes:	New Directional Antennas BA-AIO3O3T3T3VJX65F-06 and PAS2457- CC1 and 4x20MHz carriers

The updated antenna list per 1.1033(b)(4), KDB 353028 D01 and KDB 178919 D01 Section II requirements includes the information of the newly added antenna and was provided in Exhibit 2.

The supporting exhibits are assembled and presented in accordance with the *Table of Contents* attached below.

Should there be any questions or procedural issues please feel free to contact me by email and/or phone. The contacts at Nokia will comply with any request for additional information should the need arise.

Sincerely,



Terry Schwenk

R&D Engineer
Nokia Solutions and Networks
Phone: 847-809-6952
email: terry.schwenk@nokia.com

Primary Administrative Contact

Raymond J. Johnson
Technical Manager
Global Product Compliance Laboratory
Building 5B-111
600 Mountain Avenue
Murray Hill, NJ 07974
Phone: 908-582-5575
email: ray.johnson@nokia-bell-labs.com

Filing Engineer

Qin Yu
Global Product Compliance Laboratory
Phone 469-991-1892
email: q.yu@nokia-bell-labs.com

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Confidentiality Request Letter

Required Exhibits*:

EXHIBIT	FCC RULES	CONTENTS
Exhibit 1	Section 2.1033(a)	TCB Application Form 731
Exhibit 2	Sections 2.1033 (b)(4), 15.203 & 15.204, KDB 353028 D01 & 178919 D01 II	Description of Antennas
Exhibit 3	Section 2.1033 (b)(14)	Setup Drawings or Photographs
Exhibit 4	Section 2.1033 (b)(3)	Installation and Operating Instructions → Confidential
Exhibit 5	Sections 2.1033 (b)(4)	Description of Operation → Confidential
Exhibit 6	Sections 2.1033 (b)(6), 2.911 (e) & 15.407	Test Reports

*The information in the exhibits submitted in the original and C2PC filings about Certification and Qualification of Engineers, Manufacturer, Applicant and Identifier, Descriptions of Security, Block Diagrams, Schematics and Parts List, Photos and Product Label are still valid and will not be resubmitted here.