RF exposure assessment by calculation

BRU1 base stations mounting instructions assume fixed indoor mounting of the base station with an antenna mounted on the base station chassis. Relevant distances for RF exposure in practice exceed the range of the RF near-field range, thus MPE (not SAR) is addressed.

TX maximum output power is 1 W (30 dBm) at 100% duty cycle. According to formula [1] below, power density at R=1 m distance is approximately 0.013 mW / cm^2 << 0.6 mW / cm^2, assuming 2.15dB gain over isotropic antenna and ideal feed line (lossless).

$$(TX_{Pmax} * G_{TX}) / (4 * \Pi * R * R) \qquad \textbf{[1]}$$

TX_{Pmax}	maximum TX output power
G_{TX}	combined transmitter antenna gain and feeder loss
Π	3.1415
R	distance to point checked for RF exposure

The product is marketed with a chassis mounted antenna. It is required to be installed only by professional personnel. The installation manual contains a warning note requiring the installation responsible to maintain an antenna safety distance from general public to meet RF exposure limits, considering maximum output power, feeder loss and antenna gain in every case.

Above example shows margin to the commission's exposure limit ([1]) in excess of 16 dB. Any installation using higher than 16 dB combined antenna gain and feeder loss arrangements and/or closer distances than 1 m to general public shall require the installation responsible to prove RF exposure performance of his installation meets applicable limits.

([1]) Regulative reference: 47 CFR, chapter 1, part 1, subpart I, item 1.1310,
     Radio frequency radiation exposure limits,
     table 1   Limits for maximum permissible exposure,
     part (B)   Limits for general population, uncontrolled exposure
     Power density   f [MHz] /1500 [mW / cm^2] = 900 / 1500 = 0.6 [mW / cm^2]