Minimum Inbound / Outbound Signal Strength

NFPA 72 § 24.5.2 (2013, 2010)

24.5.2.3.1 Inbound *A minimum inbound signal strength of -95 dBm, or other signal strength as required by the authority having jurisdiction, shall be provided throughout the coverage area.*

24.5.2.3.2 Outbound *A minimum outbound signal strength of -95 dBm at the donor site, or other signal strength as required by the authority having jurisdiction, shall be provided throughout the coverage area.*

IFC § 510 (2015, 2012)

510.4.1.1 Minimum signal strength into the building *A minimum signal strength of -95 dBm shall be receivable within the building.*

510.4.1.1 Minimum signal strength out of the building *A minimum signal strength of -95 dBm shall be received by the Agency's radio system when transmitted from within the building.*

IBC § 916 (2015)

916.1 General *Emergency responder radio coverage shall be provided in all new buildings in accordance with Section 510 of the International Fire Code.*

What are the code-required minimum inbound / outbound signal strengths?

-95 dBm is the code-required minimum for both inbound (received) and outbound (talk-back) signal strengths. Please refer to NFPA 72 § 24.5.2 (2013,2010), IFC § 510 (2015,2012) and IBC § 916 (2015) in the sidebar.

However, it's easy to overlook the outbound signal strength minimum requirement since signal strength readings are generally only performed in-building and not at the donor site.

If signal strength readings are not performed at the donor site, how is it possible to ensure a minimum outbound signal strength of -95 dBm? The answer is by calculating the outbound signal strength based on the inbound signal strength.

First we need to determine the *signal strength difference* between the *donor site ERP* (effective radiated power) and the *portable radio's ERP,* typically 34 dBm [*Fig. 1*]. Then we need to subtract the *signal strength difference* from our *in-building signal strength* reading to determine the *outbound signal strength* [*Fig. 2*]:

([W⇨dBm] DONOR ERP) − ([34 dBm] RADIO ERP) = SIGNAL STRENGTH DIFFERENCE

Fig 1.

(INBOUND SIGNAL STRENGTH) − (SIGNAL STRENGTH DIFFERENCE) = OUTBOUND SIGNAL STRENGTH

Fig 2.

In the example below, -85 dBm is the inbound signal strength and 13 dB is the signal strength difference (47dBm - 34 dBm = 13 dB). We can calculate the outbound signal strength as -98 dBm (-85 dBm - 13 dB = -98 dBm). Although the minimum inbound signal strength is met, the site survey will fail since the outbound signal strength is below the required -95 dBm minimum [*Fig. 3*]. (**NOTE**: The numbers used in this calculation are meant to provide an example, please be sure to obtain accurate ERP figures for each individual jurisdiction.)

AN EXAMPLE: INSUFFICENT UPLINK EVEN WITH SUFFICIENT DOWNLINK RESULTS IN OVERALL "FAIL"

(Please note: donor site ERP should be checked w/ AHJ or FCC for proper offset calculation)

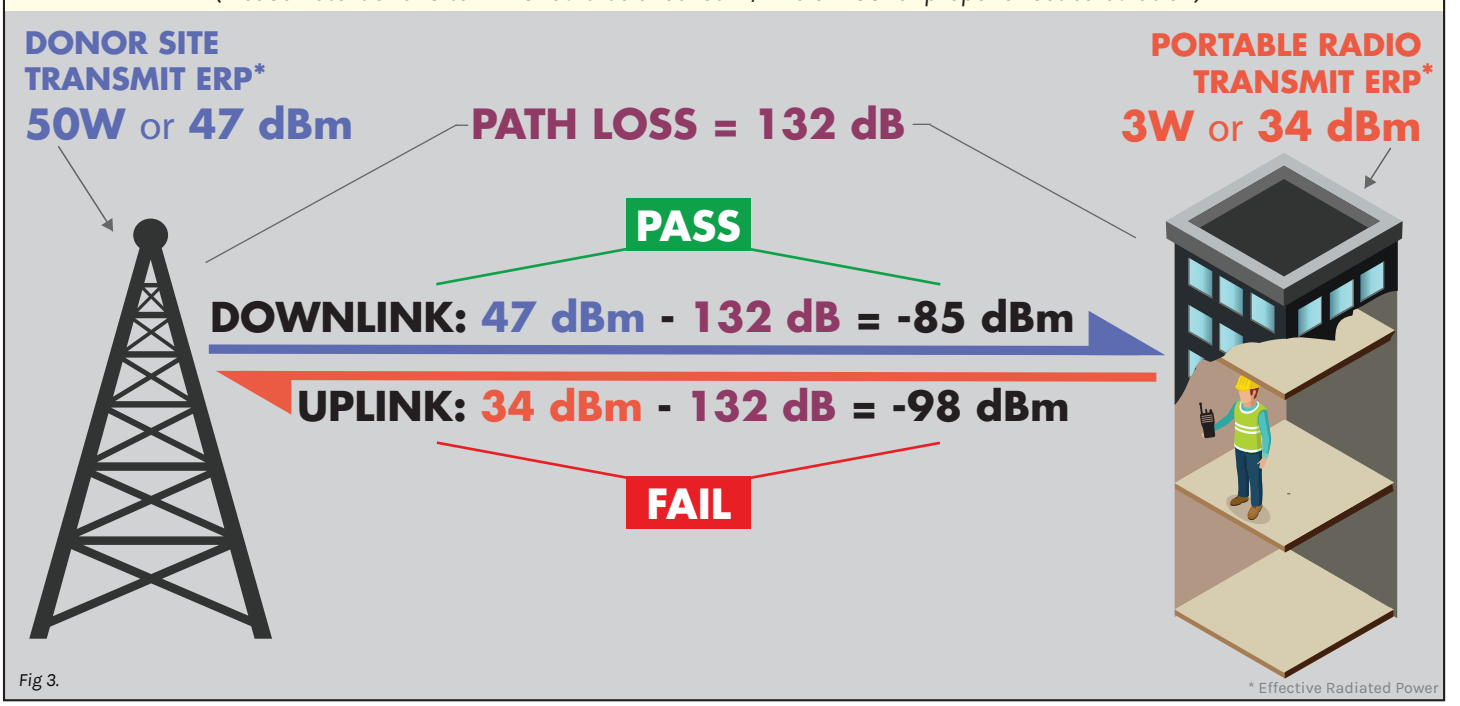

Fig 3.