

CHANNEL PERFORMANCE CRITERIA FOR WYOMING RADIO COMMUNICATIONS SYSTEMS EXHIBIT 3

In order to determine the receiver signal strength value necessary to provide a Delivered Audio Quality (DAQ) value of DAQ 3.0, DAQ 3.4 or DAQ 4.0, it's necessary to determine the Faded Performance Threshold (FPT)¹ via the following formula:

$$\text{FPT} = \text{Reference Sensitivity} - C_s/N + C_f/N \text{ (for CPC)}$$

Where DAQ 3.0, DAQ 3.4 and D4.0 have the following definitions:

- DAQ 3 Speech understandable with slight effort. Occasional repetition required due to noise distortion.
- DAQ 3.4 Speech understandable with repetition only rarely required. Some noise/distortion.
- DAQ 4 Speech easily understood. Occasional noise/distortion.

And where the Reference Sensitivity is the receiver sensitivity (at 12 dB SINAD) of the mobile or base/repeater used in the system, the C_s/N is the static carrier to noise value (determined while stationary), and the C_f/N is the faded carrier to noise value (determined while moving) for a specific channel performance criteria (CPC). For an Analog FM system with a 5 kHz modulation limitation and 25 kHz channel spacing the C_s/N is 4 dB², the C_f/N for CM 3.0, CM 3.4 and CM 4.0 is 17 dB, 20 dB, and 27 dBm, respectively³. The base/repeater receiver sensitivity values were provided by the end user for each site, if known. When no receiver sensitivity was provided, a receiver sensitivity of 0.35 μV was assumed due to the age of the equipment and the typical public safety grade equipment manufactured at the time. The mobile receiver sensitivity was also assumed to be 0.35 μV , unless otherwise provided.

Utilizing the equation shown above, Table E3-1 represents the signal strength required at the receiver of a mobile or base/repeater to obtain a desired Delivered Audio Quality level.

¹ "Wireless Communications Systems – Performance in Noise and Interference-Limited Situations – Recommended Methods for Technology-Independent Modeling, Simulation and Verification," TIA/EIA Technical Service Bulletin TSB-88A, January 1998, Pages 24-26, Page 105, and Page 113.

² See Footnote 1, Page 105.

Table E3-1. Required Channel Performance Criteria Levels

Grouping	Mobile Receiver Sensitivity (μV) at 12 dB SINAD	Base/Repeater Receiver Sensitivity (μV) at 12 dB SINAD	Receiver Sensitivity (dBm) at 12 dB SINAD	Faded Performance Threshold DAQ 3.0	Faded Performance Threshold DAQ 3.4	Faded Performance Threshold DAQ 4.0
WYDOT Maint., HP, SALECS, Wyoming State Forestry Division	0.35	0.35	-116.109	-103.109	-100.109	-93.109
Wyoming State Mutual Aid	0.35	0.35	-116.109	-103.109	-100.109	-93.109
Law Enforcement	0.35	0.35	-116.109	-103.109	-100.109	-93.109
Local Government	0.35	0.35	-116.109	-103.109	-100.109	-93.109
Fire	0.35	0.35	-116.109	-103.109	-100.109	-93.109
Road and Bridge	0.35	0.35	-116.109	-103.109	-100.109	-93.109
Medical, EMS, Hospitals, Funeral Homes	0.35	0.35	-116.109	-103.109	-100.109	-93.109
BLM and DOI base/repeaters	--	0.35	-116.109	-103.109	-100.109	-93.109
BLM and DOI mobiles	0.25	--	-119.031	-106.031	-103.031	-96.031