Abstracts

Dynamic range requirements for microcellular personal communication systems using analog fiber-optic links

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Fiber infrastructures in future personal communication systems (PCSs) must minimize remote antenna size and cost, and facilitate system maintenance and upgradeability. These goals can be met by a centralized PCS infrastructure using analog fiber-optic links. It is essential that the relationship between optical-link quality in terms of spurious-free dynamic range (SFDR) and PCS quality of service be accurately quantified so that optical device and other infrastructure design requirements can be determined. This paper presents a comprehensive wireless/optical simulation model which combines wireless system characteristics (such as fading, cochannel interference, diversity, and power control) with the noise and nonlinearities of fiber-optic links. Results of the simulation indicate that representative SFDR requirements for fiber infrastructures in PCS systems are in the 72-83 dB/spl middot/Hz/sup 2/3/ range. The impact of varying environmental characteristics as quantified by distance loss and shadowing variance is between 7-10 dB. A larger distance loss or lower shadowing variance result in lower SFDR requirements. The required automatic gain control (AGC) accuracy decreases as the SFDR increases. These results indicate that either distributed feedback (DFB) or Fabry-Perot (FP) semiconductor laser diodes can be used in the implementation of PCS infrastructures.

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