



一种基于复指数调制精确重构滤波的宽带星载数字信道化器

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CEM PRFB-based Digital Channelizer for Broadband Satellite Communications

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摘要 信道化技术是下一代宽带卫星通信系统中星载交换的关键技术之一。运用该技术,提取宽带卫星上行信号中的各窄带信号,然后经过变频、基带信号处理、交换等处理,最后综合成宽带下行信号,进入卫星下行链路。该文针对宽带卫星通信系统,提出一种基于复指数调制精确重构滤波器组的新型宽带星载数字信道化器。该信道化器既适合均匀带宽交换、又适合非均匀带宽交换的星载信道化器。数值实验表明,该新型信道化器具有较强的灵活性和可扩展性,克服了已有信道化技术只适合均匀带宽星载交换的局限,同时对信噪比和数据存储量有较大的改进和提高。

关键词: 卫星通信 非均匀带宽星载交换 数字信道化器 复指数调制 精确重构滤波器组

Abstract: The channelization technique is a key element of onboard switching in the next generation broadband satellite communication systems. With this technique, the independent communication signals can be extracted from the wideband uplink signal. And having experienced frequency down-conversion, baseband processing and switching, they are synthesized together to enter the downlink. This paper proposes a Complex-Exponential Modulation Perfect Reconstruction Filter Bank (CEM PRFB) based channelizer for broadband satellite communications, which is fit for not only homogeneous onboard switching, but also non-homogeneous onboard switching. Both floating point and fixed point simulations are carried out in detail to explicitly verify the flexibility and scalability of the proposed channelizer. With this channelizer, the limitation in existing channelization techniques is overcome. Furthermore, significant performance improvement and reduction in memory size have been demonstrated.

Keywords: Satellite communications Non-homogeneous bandwidth onboard switching Digital channelizer Complex-Exponential Modulation (CEM) Perfect Reconstruction Filter Bank (PRFB)

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