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## 通信与网络

### 基于超宽带能量检测方案的数字脉冲间隔调制

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摘要:

将数字脉冲间隔调制 (digital pulse interval modulation, DPIM) 引入到基于能量检测方案的超宽带 (ultra wideband, UWB) 通信系统中,详细研究了DPIM的性能。给出了适合于脉冲UWB信道的DPIM方案,定义了该调制方式的传输容量并与开关键控 (on off keying, OOK) 和脉冲位置调制 (pulse position modulation, PPM) 做比较。推导出该调制方式的误时隙率和误包率。给出了不同调制方式在IEEE 802.15.3a信道环境下的数值结果,结果表明存在某些调制阶数 (如4-DPIM对2-PPM),能够使得DPIM在传输容量和包差错性能上均优于PPM。另外与OOK相比,高阶DPIM可以在损失一些传输容量条件下取得更好的包差错性能。

关键词: 无线通信 超宽带 脉冲间隔调制 能量检测

### Energy detection based ultra-wideband communication using digital pulse interval modulation

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Abstract:

The digital pulse interval modulation (DPIM) is introduced into energy detection based ultra-wideband (UWB) communication systems and the performance of DPIM is studied. The modulation scheme suitable for impulse radio UWB channel is presented. DPIM transmission capacity based on the definition is analyzed and is compared with on off keying (OOK) and pulse position modulation (PPM). Expressions of slot error probability and packet error probability are derived for DPIM. Numerical results of different modulations in one of IEEE 802.15.3a models show that, for certain modulation orders (e.g., 4-DPIM vs 2-PPM), DPIM is superior to PPM in both error performance and transmission capacity. Furthermore, compared with OOK, DPIM, with a high modulation order, achieves a better error performance at the cost of certain transmission capacity.

Keywords: wireless communications ultra wideband pulse interval modulation energy detection

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