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Disturbances and Data Rate Limitation; 2.4.4 Realization of Broadband PLC Transmission Systems; 2.4.5 Performance Improvement by Efficient MAC Layer; 2.5 Summary; 3 PLC Network Characteristics; 3.1 Network Topology; 3.1.1 Topology of the Low-voltage Supply Networks; 3.1.2 Organization of PLC Access Networks; 3.1.3 Structure of In-home PLC Networks; 3.1.4 Complex PLC Access Networks; 3.1.5 Logical Network Models; 3.2 Features of PLC Transmission Channel; 3.2.1 Channel Characterization; 3.2.2 Characteristics of PLC Transmission Cable; 3.2.3 Modeling of the PLC Channel; 3.3 Electromagnetic Compatibility of PLC Systems; 3.3.1 Different Aspects of the EMC; 3.3.2 PLC EM Disturbances Modeling; 3.3.3 EMC Standards for PLC Systems; 3.4 Disturbance Characterization; 3.4.1 Noise Description; 3.4.2 Generalized Background Noise; 3.4.3 Impulsive Noise; 3.4.4 Disturbance Modeling; 3.5 Summary; 4 Realization of PLC Access Systems; 4.1 Architecture of the PLC Systems; 4.2 Modulation Techniques for PLC Systems; 4.2.1 Orthogonal Frequency Division Multiplexing; 4.2.2 Spread-Spectrum Modulation; 4.2.3 Choice of Modulation Scheme for PLC Systems; 4.3 Error Handling; 4.3.1 Overview; 4.3.2 Forward Error Correction; 4.3.3 Interleaving; 4.3.4 ARQ Mechanisms; 4.4 PLC Services; 4.4.1 PLC Bearer Service; 4.4.2 Telecommunications Services in PLC Access Networks; 4.4.3 Service Classification; 4.5 Summary; 5 PLC MAC Layer; 5.1 Structure of the MAC Layer; 5.1.1 MAC Layer Components; 5.1.2 Characteristics of PLC MAC Layer; 5.1.3 Requirements on the PLC MAC Layer; 5.2 Multiple Access Scheme; 5.2.1 TDMA; 5.2.2 FDMA; 5.2.3 CDMA; 5.2.4 Logical Channel Model; 5.3 Resource-sharing Strategies; 5.3.1 Classification of MAC Protocols; 5.3.2 Contention Protocols; 5.3.3 Arbitration Protocols; 5.3.4 IEEE 802.11 MAC Protocol; 5.4 Traffic Control; 5.4.1 Duplex Mode; 5.4.2 Traffic Scheduling; 5.4.3 CAC Mechanism; 5.5 Summary; 6 Performance Evaluation of Reservation MAC Protocols; 6.1 Reservation MAC Protocols for PLC; 6.1.1 Reservation Domain; 6.1.2 Signaling Procedure; 6.1.3 Access Control; 6.1.4 Signaling MAC Protocols; 6.2 Modeling PLC MAC Layer; 6.2.1 Analysis Method

Sommario/riassunto

Broadband Powerline Communications: Network Design covers the applications of broadband PLC systems in low-voltage supply networks, a promising candidate for the realization of cost effective solutions for "last mile" communications networks. There are many activities surrounding the development and application of PLC technology in the access area, particularly because of strong interest of new network providers after the deregulation of telecommunications market. Nowadays, there are no existing standards for broadband PLC networks, which use a frequency range up to 30 MHz. This book