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1990's; Figure 2.3 Electromechanical Protective Relays and Meters; The Mid-to Late 1990's and Early 2000's; Figure 2.4 Substation SCADA System; Figure 2.6 SCADA "Rule-Based" Volt/VAr Control System; Figure 2.5 Simple Loop Control System; The Mid-2000's to the Present (the "Smart Grid Era"); Figure 2.7 Advanced Model-Driven VVO System; Figure 2.8 High-Level DMS Configuration Block Diagram; Chapter 3 Technology Innovations in Distribution Grids Distribution System Monitoring and Control Distribution Management Systems; Figure 3.1 Vision for Data Monitoring and Control; Figure 3.2 Conceptual DMS Architecture; Figure 3.3a Traditional Paper-Driven Control Center and Operator Console Design; Figure 3.3b Modern Computer-Based Control Center and Operator Console Design; Distribution Protection Systems; Figure 3.4 Protection Relay and Controller Technologies; Volt/VAr Optimization; Figure 3.5 Reducing Technical Losses with Switched Capacitor Banks; Figure 3.6 Reducing the Voltage to Improve Efficiency Figure 3.7 Energy Conservation and Peak Shaving Using Voltage Reduction Intelligent Line Switching; Figure 3.8 Automatic Service Restoration (FLISR); Outage Management Systems; Management of Distributed Energy Resources; Figure 3.9 Dynamic Voltage Fluctuations Caused by Solar PV; Figure 3.10 Voltage Fluctuations Associated with Solar PV; Figure 3.11 Volt/VAr Characteristic of a Smart Inverter; Demand Response; Data Analytics for Managing "Big Data"; Figure 3.12 Demand Response Management System; Chapter 4 Defining a Distribution-Level Grid Modernization Strategy and Investment Plan Getting Started

Sommario/riassunto

This document provides some practical guidance on how utilities can define their own smart grid vision, identify priorities, and structure investment plans. While most of these strategic aspects apply to any area of the electricity grid, the document focuses on the segment of distribution. The guidance includes key building blocks that are needed to modernize the distribution grid and provides examples of grid modernization projects. Potential benefits that can be achieved (in monetary terms) for a given investment range are also discussed. The concept of the smart grid is relevant to any grid
