

CPC**COOPERATIVE PATENT CLASSIFICATION****Y04S****SYSTEMS INTEGRATING TECHNOLOGIES RELATED TO POWER NETWORK OPERATION, COMMUNICATION OR INFORMATION TECHNOLOGIES FOR IMPROVING THE ELECTRICAL POWER GENERATION, TRANSMISSION, DISTRIBUTION, MANAGEMENT OR USAGE, i.e. SMART GRIDS****Guidance heading:** Systems supporting electrical power generation, transmission or distribution**Y04S 10/00** Systems supporting electrical power generation, transmission or distribution

- Y04S 10/10 . Systems characterised by the monitored, controlled or operated power network elements or equipment ([not used, see subgroups](#))
- Y04S 10/12 . . the elements or equipments being or involving energy generation units, including distributed generation [DER] or load-side generation
- Y04S 10/123 . . . the energy generation units being or involving renewable energy sources
- Y04S 10/126 . . . the energy generation units being or involving electricity based vehicles, i.e. power aggregation of electric vehicles [EV] or hybrid vehicles [HEV] ([remote or cooperative charging Y04S 30/12; details associated with the interoperability in the section of transportation, e.g. vehicle recognition, authentication, identification or billing Y04S 30/14](#))
- Y04S 10/14 . . the elements or equipments being or involving energy storage units ([for systems comprising uninterruptible power supplies or standby generators Y04S 20/12](#))
- Y04S 10/16 . . the elements or equipments being or involving electric power substations
- Y04S 10/18 . . the elements or equipments being or involving switches, relays or circuit breakers, e.g. intelligent electronic devices [IED]
- Y04S 10/20 . . the elements or equipments being or involving protection elements, arrangements or systems
- Y04S 10/22 . . the element or elements being flexible AC transmission systems [FACTS] or power factor or reactive power compensating or correcting units
- Y04S 10/24 . . the elements or equipments being or involving voltage regulating units
- Y04S 10/26 . . the elements or equipments being or involving measuring units
- Y04S 10/265 . . . the elements or equipments being or involving phasor measuring units [PMU]
- Y04S 10/30 . Systems characterised by state monitoring, e.g. fault, temperature monitoring, insulator monitoring, corona discharge
- Y04S 10/40 . Systems characterised by the display of information, e.g. of data or controls
- Y04S 10/50 . Systems or methods supporting the power network operation or management, involving a certain degree of interaction with the load-side end user applications ([not used, see subgroups](#))
- Y04S 10/52 . . Outage or fault management ([not used, see subgroups](#))
- Y04S 10/522 . . . Fault detection or location
- Y04S 10/525 . . . Power restoration
- Y04S 10/527 . . . Power quality monitoring

- Y04S 10/54 . . Management of operational aspects, e.g. planning, load or production forecast, maintenance, construction, extension
- Y04S 10/545 . . . Computing methods or systems for efficient or low carbon management or operation of electric power systems
- Y04S 10/56 . . Supply chain or logistics
- Y04S 10/58 . . Financial aspects
- Y04S 10/60 . . Reporting; Information providing; Statistics or analysis

Guidance heading: **Systems supporting the management or operation of end-user stationary applications, including also the last stages of power distribution and the control, monitoring or operating management systems at local level**

Y04S 20/00 **Systems supporting the management or operation of end-user stationary applications, including also the last stages of power distribution and the control, monitoring or operating management systems at local level**

- Y04S 20/10 . System characterised by the monitored, controlled or operated end-user elements or equipments ([not used, see subgroups](#))
- Y04S 20/12 . . the elements or equipments being or involving energy storage units, uninterruptible power supply [UPS] systems or standby or emergency generators involved in the last power distribution stages ([energy storage units involved in power generation, transmission and distribution Y04S 10/14; uninterruptible power supply systems or standby or emergency generators as end-user application Y04S 20/248](#))
- Y04S 20/14 . . The elements or equipments being or involving protection elements, switches, relays or circuit breakers
- Y04S 20/16 . . The elements or equipments being or involving power plugs, sockets, adapters or power strips
- Y04S 20/18 . . The element or elements being a direct current power network, grid or distribution line
- Y04S 20/20 . End-user application control systems ([not used, see subgroups](#))
- Y04S 20/22 . . The system characterised by the aim of the control ([not used, see subgroups](#))
- Y04S 20/221 . . . General power management systems
- Y04S 20/222 . . . Demand response systems, e.g. load shedding, peak shaving
- Y04S 20/224 Curtailment; Interruptions; Retail price-responsive demand
- Y04S 20/225 . . . The system entering an energy saving mode, i.e. sleep, low-power or standby modes
- Y04S 20/227 . . . Domotics or building automation systems
- Y04S 20/228 Characterised by involving a home automation communication network
- Y04S 20/24 . . The system characterised by the end-user application ([not used, see subgroups](#))
- Y04S 20/242 . . . the end-user application being or involving home appliances
- Y04S 20/244 the home appliances being or involving heating ventilating and air conditioning [HVAC] units
- Y04S 20/246 the system involving the remote operation of lamps or lighting equipment
- Y04S 20/248 . . . the end-user application involving uninterruptible power supply [UPS] systems or standby or emergency generators ([for uninterruptible power supply systems or standby or emergency generators in the last power distribution stages Y04S 20/12](#))

- Y04S 20/30 . Smart metering
- Y04S 20/32 . . Systems characterised by remote reading
- Y04S 20/322 . . . from a fixed location
- Y04S 20/325 . . . from a mobile location
- Y04S 20/327 . . . The remote reading system including mechanisms for turning on/off the supply
- Y04S 20/34 . . Systems which determine the environmental impact of user behavior
- Y04S 20/36 . . Methods or devices for detecting or reporting abnormalities, e.g. faults, outages, leaks
- Y04S 20/38 . . Identification of individual loads by analysing current or voltage waveforms
- Y04S 20/40 . . Displaying of usage with respect to time, e.g. monitoring evolution of usage, relating usage and weather conditions
- Y04S 20/42 . . Utility meters which are networked together, e.g. within a single building
- Y04S 20/44 . . Displaying utility price or cost
- Y04S 20/46 . . Remote display of meters readings
- Y04S 20/48 . . Methods for determining the topology of meters in a network
- Y04S 20/50 . . Retrofitting of installed meters
- Y04S 20/52 . . Systems oriented to metering of generated energy or power
- Y04S 20/525 . . . Monitoring the performance of renewable electricity generating systems, i.e. of solar panels

Guidance heading: Systems supporting specific end-user applications in the sector of transportation

Y04S 30/00 Systems supporting specific end-user applications in the sector of transportation

- Y04S 30/10 . Systems supporting the interoperability of electric or hybrid vehicles (not used, see subgroups)
- Y04S 30/12 . . Remote or cooperative charging
- Y04S 30/14 . . Details associated with the interoperability, e.g. vehicle recognition, authentication, identification or billing

Guidance heading: Communication or information technology specific aspects supporting electrical power generation, transmission, distribution or end-user application management

Y04S 40/00 Communication or information technology specific aspects supporting electrical power generation, transmission, distribution or end-user application management

- Y04S 40/10 . Communication technology specific aspects (not used, see subgroups)
- Y04S 40/12 . . Details of the transmission structure or support between the monitoring, controlling or managing units and monitored, controlled or operated electrical equipment (not used, see subgroups)
- Y04S 40/121 . . . Using the power network as support for the transmission
- Y04S 40/122 Using pulsed signals
- Y04S 40/123 Using modification of a parameter of the network power signal
- Y04S 40/124 . . . Using a data transmission bus

- Y04S 40/125 . . . Using phone lines
- Y04S 40/126 . . . Using wireless data transmission
- Y04S 40/127 by means of mobile telephony
- Y04S 40/128 . . . Using Internet
- Y04S 40/14 . . Aspects related to the treatment or conditioning of data or signals ([not used, see subgroups](#))
- Y04S 40/143 . . . Associated to the communication via dedicated transmission supports
- Y04S 40/146 . . . Associated to the communication via the power transmission network
- Y04S 40/16 . . Details of management of the overlaying communication network between the monitoring, controlling or managing units and monitored, controlled or operated electrical equipments ([not used, see subgroups](#))
- Y04S 40/162 . . . related to configuration or provisioning
- Y04S 40/164 . . . related to network topology
- Y04S 40/166 . . . related to fault management
- Y04S 40/168 . . . for performance monitoring
- Y04S 40/20 . Information technology specific aspects ([not used, see subgroups](#))
- Y04S 40/22 . . Computer aided design [CAD]; Simulation; Modelling
- Y04S 40/24 . . Arrangements for network security or for protecting computers or computer systems against unauthorised activity, e.g. cyber security

Guidance heading: **Market activities related to the operation of systems integrating technologies related to power network operation and communication or information technologies**

Y04S 50/00 **Market activities related to the operation of systems integrating technologies related to power network operation and communication or information technologies**

- Y04S 50/10 . Energy trading, including energy flowing from end-user application to grid
- Y04S 50/12 . Billing, invoicing, buying or selling transactions or other related activities, e.g. cost or usage evaluation
- Y04S 50/14 . Marketing, i.e. market research and analysis, surveying, promotions, advertising, buyer profiling, customer management or rewards