

Networked Telkonet SmartEnergy™

Lower HVAC costs without compromising occupant comfort

A Green Solution

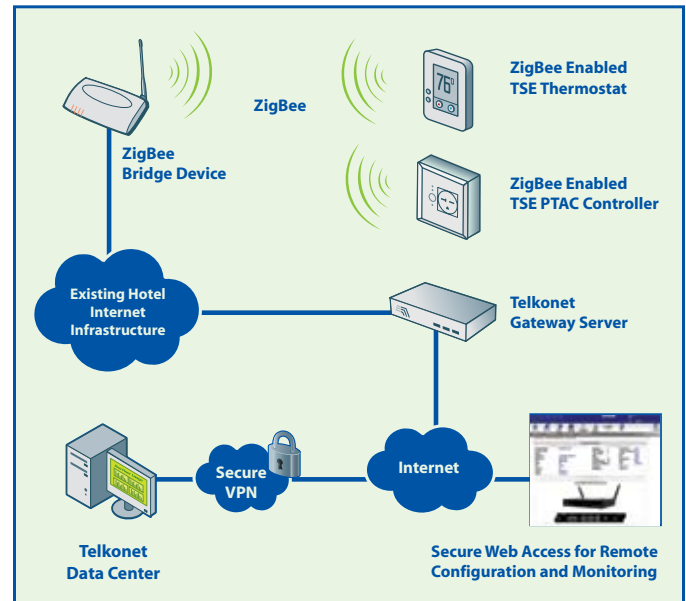
Networked Telkonet SmartEnergy (NTSE), an intelligent, advanced networked energy management system, provides property owners with a green approach to controlling heating, ventilation and air conditioning (HVAC) usage and improving energy efficiency. With HVAC costs typically accounting for more than 30% of a building's electricity costs, controlling in-room energy consumption can significantly impact a property's bottom line. NTSE achieves energy savings by using Telkonet Energy Management Occupancy Sensors with smart, programmable Telkonet Energy Management Thermostats to adjust and maintain a room's temperature according to occupancy, eliminating unneeded heating and cooling of vacant rooms. The system also reduces the run-time for heating, ventilation and air conditioning (HVAC) equipment, helping to decrease maintenance overhead and increase the equipment's working life, resulting in further maintenance savings.

Patented Recovery Time Technology™

Unlike other systems, NTSE delivers optimum energy savings without compromising occupant comfort thanks to its unique, patented Recovery Time™ (RT) technology. When a room is occupied, the occupant's selected temperature will be maintained. When the Energy Management Occupancy Sensor determines that the room is unoccupied, the Energy Management Thermostat adjusts the room temperature using patented Recovery Time technology. Unlike other systems, RT technology constantly performs calculations that evaluate how far each room's temperature can drift from the occupant's preferred setting (setpoint), to maximize energy savings and still

NTSE Features

- Wireless retrofit for simple, seamless installation
- Self-healing network architecture
- Dynamic reconfiguration
- Network outage and maintenance alerts
- Simple integration with Property Management Systems (PMS)
- Real-time central and remote HVAC monitoring, diagnosis and control
- Room occupancy status detection
- Peak demand load shedding
- Management energy savings reports
- Detailed measurement and verification analysis



return within management's preset recovery time. Recovery time is selected by property management at the time of NTSE installation; however, it can be altered at any time by management.

With RT technology, the unoccupied room temperature will only drift far enough to ensure the system will return to the occupant's preferred temperature setting within minutes upon their return to the room. Each room is evaluated independently in real-time to determine its energy efficient temperature, or setback, based on many environmental conditions:

- Occupant's preferred temperature setting
- Location of the room within the building
- Window placement – facing sun or shade; drapes open or closed
- Dry or humid climate
- Varying weather conditions throughout the day
- Condition of the HVAC unit, such as age and efficiency

As a result, RT technology delivers room-by-room, occupant-by-occupant savings. Other energy management systems use a fixed setback system, where the setback temperature is often set to one fixed temperature, or the user's setpoint is increased/decreased by a fixed deviation, resulting in lower energy savings and potentially uncomfortable room temperatures or recovery times which result in guest complaints.

An Efficient Networked Infrastructure

NTSE utilizes a wireless IEEE802.15.4 "mesh" network, where each device functions as a wireless repeater, enabling Energy Management Thermostats to communicate with each other and aggregate communications up to a single master Telkonet Gateway Server on-site. This wireless "mesh" creates a robust, reliable, and self-healing network – allowing central control without expensive back-haul wiring. It also gives NTSE instant and infinite scalability, and surprisingly low installation costs.

NTSE has the ability to utilize existing investments that have been made in Internet/Intranet networks throughout buildings by utilizing IEE802.15.4 mesh to Ethernet bridge devices. Networked Telkonet SmartEnergy provides scalability in even the harshest of environments and shortest of timeframes. Network polling rates of 15 minutes save data to network operations center databases for quick and easy access to reports.

Networked for Performance

NTSE stores detailed data about a property's HVAC system and its energy consumption to effectively calculate the actual energy savings. Network polling from the Telkonet Gateway Server to the Energy Management Thermostats (EMT) occurs on a regular 15 minute interval, aggregating and storing centrally on the Telkonet network operations center (NOC) databases. Off-site data storage maximizes the measurement and verification (M&V) capabilities and system reporting abilities. For hospitality markets, the Telkonet Gateway Server can be integrated into a property management system (PMS). NTSE generates further energy cost savings and efficiencies, including the following.

Room occupancy detection – NTSE detects when rooms are unoccupied, resulting in deeper energy savings. The system can pre-cool/heat rooms upon guest check-in at the front desk, giving rooms additional time to return to the setpoint temperatures before guests arrive in the rooms. The unoccupied mode also prevents housekeeping from triggering Energy Management Occupancy Sensors when cleaning vacant rooms.

Proactive issue response – Through analysis of historical HVAC operational performance and comparative room efficiency, NTSE detects changes in operational effectiveness of HVAC equipment to resolve issues quickly and effectively. The network alerts facility management via email or text message of any HVAC system, occupancy sensor or thermostat issues before they become emergencies or impact occupants.

Real-time remote management – The web-based portal, Telkonet CENTRAL, enables remote monitoring and management of all NTSE devices, without requiring proprietary software, plug-ins or per-seat licensing, reducing IT

NTSE Benefits

- Delivers maximum room-by-room energy savings
- Ensures occupant comfort
- Cost-effective installation
- Improves profitability
- Rapid return on investment of typically 2 to 3 years
- Reduces operation expenses and improves service
- Longer life and reduced maintenance on HVAC units
- Humidity protection
- Provides visibility into the health of HVAC units at any time
- Helps manage peak demand

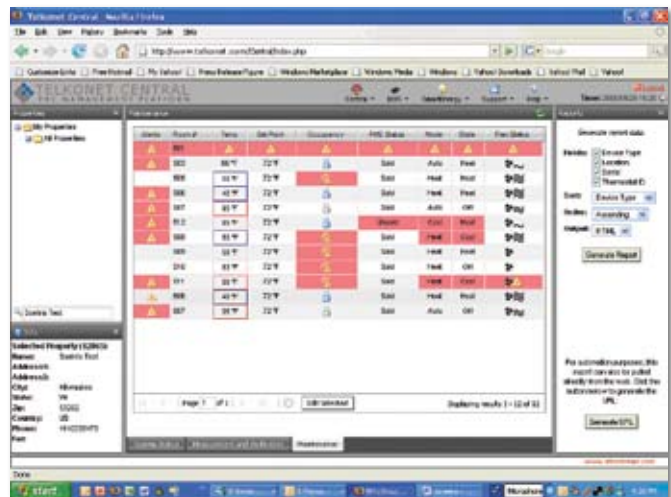
resources and facility management costs. By implementing instant changes across the entire network, savings and ROI are maximized, ensuring efficient operation.

Detailed energy management reports – NTSE provides facility management with detailed measurement and verification (M&V) analysis, showing the system's achieved savings and ROI.

- **System Efficiency Report** – Lists rooms with above average runtime in heat or cool mode, possibly signifying the need for cleaning or replacement
- **Occupancy Report** – Monitors motion in any rooms listed as unoccupied in the PMS interface
- **Savings Report** – Shows runtime hours and kilowatt hours saved on a room-by-room level basis
- **System Status Report** – Shows battery strength issues in rooms, indicating rooms that may have lost Energy Management Occupancy Sensors
- **System Diagnostics Report** – Indicates abnormal heat/cool patterns in rooms to indicate potential problems with the HVAC system



HVAC room settings can be easily changed with the touch of a few buttons on the virtual thermostat.



The System Status/Alert Screen provides a comprehensive, sortable list of HVAC conditions and occupancy status by room, as well as alerts generated by room.

Telkonet CENTRAL Management Platform

Securely accessible from any web browser, Telkonet CENTRAL gives facility management local and remote access to comprehensive remote management and reporting tools. Control that was only previously available in high-end building automation systems is now cost-effective, providing additional efficiencies. Management can view the real-time status and occupancy of a room and dynamically control, monitor status, and define rules and events for HVAC system operability, both en masse and individually.

Telkonet CENTRAL provides a system-wide overview, as well as detailed room-by-room information, including temperature, setpoint, occupancy, PMS status, fan status, and history. In the event of unusual HVAC performance, the Control Center immediately provides alerts of any issues.

Telkonet CENTRAL offers many features and benefits.

- Secure web-based remote access
- Optional link to reservations system
- Multi-building control and aggregate reporting
- Multi-user access and security levels
- Real-time control and status of any device
- Building, zone, room, and device level control
- Hidden, customizable thermostat safety and user limits, including device lockout
- Timed events by minutes, hour, day, week, or year
- Maintenance alerts by email or text message
- Complete device, room and zone history
- Detailed live savings graphs and reports
- Integrated ROI calculation tools

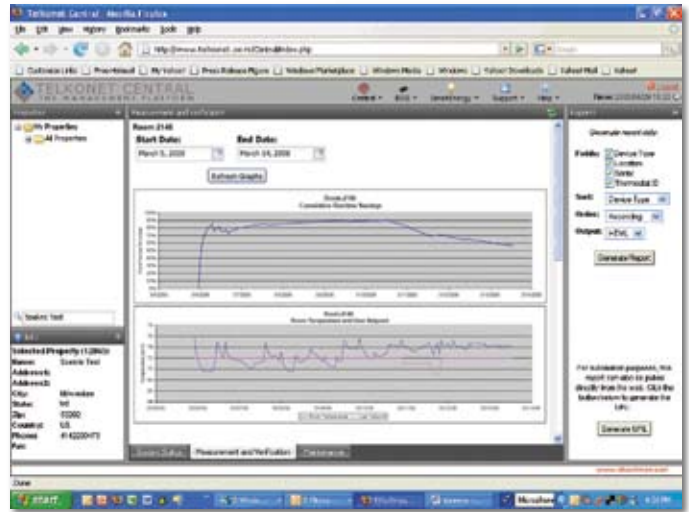
Energy Management Thermostat Operation Profiles

To achieve the most granular level of support, five operational profiles are available for the networked Energy Management Thermostats (EMT): Default, Maintenance, Unsold, Deep Setback, and Demand. The EMTs are only set in a single state of operation at one time. Profile settings can be easily adjusted via the web access by logging into the Telkonet CENTRAL Management Console.

- **Default Profile** – This normal operation setting is used when occupants are in a space or have recently been in a space.
- **Maintenance Profile** – This signifies that the space is out of service and might be in a temporary state, allowing workers to operate the environment to some degree of control.
- **Unsold Profile** – This is entered by integration into a Property Management System or forced via command on the Telkonet CENTRAL web console. The Unsold Profile locks down the EMT, so even if occupancy is detected from maid service or maintenance, the setback temperature will remain in place.
- **Deep Setback Profile** – This forces a longer recovery time when a space is rented but the occupants are away for an extended period of time. Upon crossing the defined extended time period, the EMT adjusts to

the deep recovery state and unlike the Unsold Profile, upon motion, the EMT will automatically start its recovery back to the occupant setpoint temperature.

- **Demand Profile** – This defines how the room functions during a demand-limiting event. For example: Demand Profile can be used to cycle A/C in rooms in a pattern so that room temperatures may not be greatly impacted but peak load is limited.



The Measurement and Verification screen generates a graph to summarize HVAC runtime versus occupancy or energy savings over time.

HVAC Configuration Class

Networked Telkonet SmartEnergy is flexible and can be used on almost all HVAC systems. An HVAC Configuration Class defines the energy efficiency characteristics of the HVAC system. NTSE allows for multiple HVAC configuration classes, enabling a different configuration to be assigned to each type or model of PTAC or HVAC system at a property. Each Energy Management Thermostat then is assigned into a single class. The classes contain all the relevant KW, KWh, therms, BTU, etc. about the local or central HVAC system controlled by that device. This information is then used in the M&V and ROI calculations to detail savings achieved on a system-by-system basis. There is no limit to the number of HVAC classes in a single network system.

System Status and Alerts

The System Status provides a quick, sortable view of current HVAC conditions for each Energy Management Thermostat, including current temperature, set point, occupancy, mode, and fan speed. These settings can be easily changed with a double click to bring up the virtual thermostat.

System Alerts are generated via emails or paging when any of these conditions occur within the EMT: temperature above/below set thresholds, occupancy sensor removed, thermostat not responding, runtime maximum reached, above average runtime, unsold but occupied.

System Status and System Alerts enable facility managers to effectively clean, maintain, repair, and replace thermostats, as well as proactively monitor for HVAC issues.

Measurement & Verification

Detailed Energy Management Thermostat savings are available for three years, along with aggregated property-wide savings data. A dynamic reporting engine graphs of all the data points to illustrate runtime versus occupancy or savings over time. Networked Telkonet SmartEnergy records a considerable amount of data points and logs them to a central secure network operations center (NOC) for fast, easy reporting.

Demand Response

With NTSE, properties can reduce their overall demand by operating more efficiently based on occupancy, as well as participate in Load Shed programs that are very transparent to occupants. NTSE implements strict guidelines to effectively rotate the load, running the air conditioning units in alternating shifts to reduce the peak KW usage without impacting the room temperature and comfort.

Through the local Telkonet Gateway Server and network operations center, a remote API is available for easy integration with third party software. An XML RPC interfaces to Demand Response capabilities and extends for future technology. Integration with third party kWh meters gives the option for both hotels and operators to have near real-time feedback on actual load change.

Telkonet SmartCare Warranty Program

Telkonet's SmartCare extended warranty program covers NTSE monitoring and reporting for a single property or multiple properties. Telkonet's web-based management tools and alerts are directly accessible by both facility managers and Telkonet's help desk. This enables Telkonet's support team to proactively monitor and support a property's NTSE remotely, in real time, immediately reporting any problems to property management or dispatching Telkonet field services for repair and maintenance operations.

Telkonet's SmartCare Extended Warranty Program includes:

- Annual inspection of all installed available units
 - Coil cleaning and filter changing (optional)
 - Data collection for a representative sampling of rooms
 - Management reports for runtime savings data, HVAC unit performance, occupancy statistics, payback/ROI analysis
 - On-site training
 - Annual battery replacement
 - Repair or replacement of defective parts/products
- Software updates
- Secured on-line access for support, training and software downloads
- 24x7 telephone support

NTSE Components



SS2000 Energy Management Occupancy Sensor

The SS2000 uses digital signal processing and passive infrared technology to detect motion and body heat in a room, including sensing when a person is sleeping. Typically placed on the ceiling, the SS2000 communicates via a wireless radio link to the SS5000.



SS5000 Energy Management Thermostat (EMT)

The SS5000 maintains the occupant's preferred setpoint (temperature setting) when the room is occupied. When vacant, the SS5000 recalculates the setpoint, allowing the temperature to drift to the new temperature determined by the preferred recovery time. The SS5000 regularly adjusts the temperature to energy-efficient settings.

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