The Carrier Comfort Network is the most advanced technology to evolve from Carrier's thorough knowledge of both comfort and controls. It offers the owner, designer and installer:

- integrated product and control systems
- single-point responsibility
- unique control strategies
- overall lower installation costs
- enhanced monitoring capabilities

**Building Supervisor and ComfortWORKS** - A powerful software package that provides a 'window' into the Carrier Comfort Network (CCN) to allow centralized monitoring (local and remote), data collection, report generation and system configuration.

The Building Supervisor is designed to run on a variety of IBM and IBM-compatible computers. Customized reports can be created using Lotus 123 macros. In addition, other DOS-based software programs can be run while the Building Supervisor continues to run in the background. ComfortWORKS is a Windows-based software package designed for larger scale building management needs where multiple user access is desired via a LAN.

**Product-Integrated Controls** - Whilst each equipment component can operate in a stand-alone mode, all components form a fully-integrated and balanced HVAC system when networked with other Carrier equipment through the Carrier Comfort Network.

**System Manager** - Carrier-specific network products designed to provide overall management of an individual system subset.

**Comfort Controller** - A field-installed device which allows non-Carrier equipment such as boilers, cooling towers and lighting to be controlled and be integrated into the overall network.

**Product-Integrated Controller** - A factory-installed product with a level of monitoring and diagnostic control that can only be achieved with a factory-integrated device.

**Network Options** - The essential elements of a Building Management System providing diverse facilities such as remote monitoring, collection of performance data, maintenance management and customized reporting capabilities.

**Easy Connection** - A three-wire cable is all that is required to connect these products and bring the network to life.

From specifying through to servicing, the simplicity of the Carrier Comfort Network technology makes it the definitive reason why Carrier continues to be a leader in comfort control technology.
System Managers
Carrier offers a complete line of network system products that tie multiple stand-alone products together for a fully integrated, self-adjusting HVAC system designed to increase equipment efficiencies while minimizing operating and maintenance costs.

Chiller plant control:
- Flotronic System Manager
- Chillervisor System Manager

Water side management:
- Water System Manager
- Fan Coil System Manager

Digital Air Volume:
- Terminal System Manager

Flotronic System Manager (FSM)
Carrier's 30 Series Flotronic II chillers and Pro-Dialog Plus chillers have set world-class standards of performance with their advanced factory-integrated DDC controllers. Now the Flotronic System Manager combines up to eight of these chillers and ancillary equipment such as pumps and bypass valves into an integrated system which:
- raises the overall energy efficiency of the chiller plant
- provides customised chiller operating sequences
- maximizes the use of part-load operation
- automatically compensates for chiller unavailability
- provides chiller plant performance and operation data

Chillervisor System Manager (CSM III)
The Chillervisor System Manager provides overall supervisory control of a chiller plant comprising up to eight chillers equipped with PICs (Global Chiller, 30 series, 19 series). The CSM offers:
- PID temperature control of the chiller plant
- load balancing of the chillers for optimum efficiency
- local, remote or automatic start/stop of the chiller plant
- smooth transitional loading and unloading of chillers
- automatic compensation for unavailable chillers
- chiller sequencing based on runtime or weekly rotation
- chiller plant performance and operation data

Water System Manager (WSM)
The Water System Manager reduces the overall building energy costs by providing the vital link between the airside plants and the central cooling and heating plants.
The WSM:
- monitors the airside PICs and Terminal System Managers to determine overall heating and cooling loads
- enables heating and cooling sources as appropriate
- resets chilled water and hot water temperatures based on load requirements
Digital Air Volume (DAV)

A DAV system allows fully-integrated control of airsided HVAC equipment - specifically air terminals and their respective air handling plants. Closed-loop control ensures dynamic equipment response to changing space conditions, enabling each equipment component to adjust its operation to effectively match the building load.

Each terminal has a factory-integrated Terminal Control Unit (TCU) to provide both temperature and air flow control for each zone, thus ensuring optimum comfort.

A Terminal System Manager (TSM) monitors the conditions of up to sixty-four terminals and optimises the output of associated air handlers, based on the composite information from all terminals linked to each air source.

The Terminal System Manager:
- provides optimum control of air handlers based on zone demand
- groups terminals for simplified control
- ensures proper air flow to all occupied zones
- provides monitoring and alarm facilities for abnormal building conditions
- controls humidity or indoor air quality (IAQ) based upon your individual zone setpoints
Comfort Controller

The Comfort Controller is a family of modular controllers that provide general purpose HVAC control and monitoring capability in a stand-alone or network environment using closed loop direct digital control (DDC). These controllers can also control and monitor equipment such as pumps, boilers, cooling towers and lighting using Carrier-proven algorithms as well as custom programming via BEST++ language. The Comfort Controller gives the Carrier Comfort Network the capability to control non-Carrier equipment and Carrier equipment not equipped with factory-installed controls.

The Comfort Controller supports the following features:
- Stand-alone control and monitoring of up to 16 field points, using proven algorithms.
- Support of the UT203 FID family of I/O modules for retrofit and upgrade applications.
- Compatibility with the following interface devices: Local Interface Device (LID), ComfortWORKS, Building Supervisor III, System Access Module (SAM), and Network Service Tool III.
- Three LEDs, conveniently located on the front of the module, indicate processor status (red), CCN Communication Bus status (yellow), and I/O module communication status (green).
- Entire database at your disposal. Based on your application’s requirements, you determine how many and which algorithms, inputs/outputs, schedules, alarms and system functions to include in the database. Therefore, the database will only consist of the items that are necessary for the application - valuable memory space is not wasted.
- Ability to display the amount of available database space.
- Ability to add items to database as necessary.
- Local connection for LID and CCN.
- Total facilities management when linked to a CCN.
- Ability to disable all inputs, all outputs, or disable both inputs and outputs by simply flipping a switch.
- Two-day backup of clock and data such as Data Collection and Runtime.
- Simplified field wiring using ‘plug type’ terminals (two-pin connection).
- No need for batteries.
- Optional Comfort Controller 6400-HOA (Hand-Off-Auto) consisting of eight switches that provide you with the capability to override manually each discrete output point.
- Uses any standard, field-supplied 24 VAC, 60 VA transformer.

Standard HVAC control algorithms are provided to facilitate faster, more reliable application configuration. These include:
- Cooling and heating control
- Space temperature comfort zone
- Humidification and dehumidification
- Mixed air damper optimization
- VAV fan control
- VAV supply and return fan tracking
- Indoor Air Quality
- Generic PID control
- Time scheduling with/without override
- Analogue temperature control
- Discrete interlock
- Staged thermostat
- Proportional thermostat
- Primary/secondary pump control
- Staged discrete control
- Permissive interlock
- Night-time free cooling
- Morning warm-up
- Adaptive optimal start/stop
- Control point reset

- On-board consumable point - calculates a usage value (kWh, gal/hr, lbs/hr, etc.) in applications where simple data collection is required.
- On-board trending - collects up to 48 data samples per point (with an adjustable iteration rate) on a revolving basis, or stops the trending after 48 samples are collected. Used as means of troubleshooting.

Refer to the Comfort Controller Application Guide (Order No. 808-892) for details on the following control routines:
- Chilled water pump and differential bypass control
- Cooling tower plant
- Constant volume air handling unit
- Constant volume rooftop unit
- Primary/secondary chilled water circuit
- Steam-to-hot water converter with outside air temperature reset
- Variable Air Volume air handling unit

When included in a network with other CCN controllers, Option Modules and user interfaces, the following additional capabilities are possible:
- Alarm processing, messages and annunciation
- Runtime, history and consumable data collection and report generation
- Demand limiting/loadshedding
- Broadcast of data such as outside air temperature, outside air humidity and time of day
- Data transfer between system elements
- Timed overrides for use with Tenant Billing
- Airside and waterside linkage

Custom Programming - BEST++

Carrier’s Building Environmental Systems Translator (BEST) is a custom programming language that provides the ability to enhance the Comfort Controller's standard algorithms. Similar to BASIC programming, the programming environment allows you to select from menu bias similar to a Windows-based application. A full screen text editor, several debugging features and a method for quick compiling of programs and on-line help are just some of the features provided.
ComfortWORKS

ComfortWORKS is the Carrier Corporation software that is the primary human interface to the Carrier Comfort Network (CCN).

The software is designed to run on a variety of IBM and IBM-compatible microcomputers utilizing the Microsoft Windows NT Workstation operating system. The system provides a single entry point which allows viewing of the entire HVAC system by linking the computer to all other Carrier communicating modules with a simple three-wire connection. With more complex or larger buildings where multiple points of entry are desirable, this software package can be run on multiple computers connected by a LAN. Because of its multitasking capability, ComfortWORKS can carry out a number of automatic and operator-initiated tasks simultaneously.

ComfortWORKS provides an environment from which you can easily perform the following tasks:
- Display dynamic data in both text and graphic modes
- Create dynamic trend plots of data from one or multiple controllers
- View, print and acknowledge alarms from the network
- Configure operating parameters such as time schedules, setpoints and point configuration
- Downline load data to and upline load data from controllers
- Override the state or value of selected input and output points
- Customize graphics and create custom links from graphic to graphic
- Generate reports from system data
- Create custom WorkSPACES for each user
- Obtain on-line operator help

Features

- True System Multi-tasking - no need for a dedicated PC - other Windows application software can run simultaneously.
- Local Area Network - allows multiple workstations to share a common system database. Allows use of most existing building LANs.
- Remote Communications - allows access to remote ComfortWORKS databases, allowing you to perform all ComfortWORKS functions from off-site.
- Graphical User Interface (GUI) - provides a consistent look and intuitive operation, utilizes standard Windows features and operations.
- Super VGA high resolution graphics.
- Customized Access Levels - provides you with the capability to create custom operator access levels and to define which functions are included in each level. You can allow or prohibit operator access on an area-by-area basis.
- Export data into other application software - you can transport ComfortWORKS data to popular spreadsheet, word processor and database programs.

ComfortWORKS provides the tools you need for monitoring, configuring and analyzing your facility's daily HVAC operations. You can achieve optimum results using the following ComfortWORKS features and functions:
- WorkSPACE Manager function - You can create customized displays of data that you care about most and save them as WorkSPACES. Each WorkSPACE can consist of multiple graphic and tabular displays of any type of data, including trending information.
- Dynamic Trending - You can elect to trend any available realtime data point, and store historical data in a format compatible with spreadsheet industry standards.
- Simultaneous Dynamic Displays - You can simultaneously display data from multiple controllers - either controllers located in the same area, or, using concurrent modem connections, data from controllers at remote areas.
- Fast Alarm Response - You can see and acknowledge incoming alarms, regardless of the application that you have running on your computer. With the click of the mouse, you can jump to the WorkSPACE that is pertinent to the given alarm condition. You can record the action you have taken in response to an alarm by attaching a note to the alarm entry. You can suppress the annunciation of specified alarm conditions to avoid interruption by known 'nuisance-type' alarms.
- Database - Depending on how you set up your ComfortWORKS system, your database can be shared by other ComfortWORKS users at other computers. Changes made by ComfortWORKS users can be recorded in a central area to create a common source of data.
- Logical Controller Groupings - You can group controllers into user-defined buildings, floors, areas or regions, independent of your Carrier Comfort Network architecture.

Building Supervisor

The Building Supervisor is a powerful management tool which provides the user with:
- management of local and remote buildings
- real-time colour-graphic display of plant and space conditions
- monitoring and alarm facilities
- configuration and adjustment of system parameters
- centralised information management, typically:
  - report generation with access to spreadsheets
  - interactive graphic displays
  - performance trends, tabular and graphical
  - maintenance data and reports
  - alarm logs and analysis
Network Options

Network options are individual programs that can be added to the Carrier Comfort Network via individual modules which provide a diverse set of system facilities. The following network options are available.

Autodial Gateway - used in conjunction with a modem, the Autodial Gateway provides a connection into a Carrier Comfort Network from a remote location. Once connected, dynamic data can be monitored, diagnostic and maintenance information can be collected and reports generated. An Autodial Gateway connected directly to the local network performs automatic alarm reporting to an off-site monitoring or service centre.

Network Directory Services (NDS) - this option maintains a current database of all controllers and network options connected to the Carrier Comfort Network. The NDS automatically verifies correct system time and communicating status of each device to ensure proper operation of the HVAC system. Failure of any device can be immediately detected via an alarm message.

Data Collection - this option acquires and stores historical data such as equipment runtime status (on/off times and duration), consumable data (kW) and history data such as trends of equipment status, temperature sensor values versus set points. Data can be retrieved locally or remotely (via an Autodial Gateway) for report generation.

Data Transfer - this option shall allow data from one controller to be used by another controller to reduce system installation cost and redundancy. For example, a single outside air sensor can be installed and its value used by other devices on the network controlling this parameter.

Loadshed - this option shall perform electrical demand limiting for the building control system. It shall provide the ability to reduce electrical demand by first extending duty cycle off-times and set point limits and then shed operator-selected loads for additional energy savings during peak load periods.

Tenant Billing/Timed Override - this option allows collection, evaluation and storage of the amount of time that individual tenants request equipment usage during off-hours. Pre-defined costs can be used to charge tenants for each hour of override request.

Maintenance Management - this option acquires and stores system alarm information specific to equipment maintenance conditions. For example dirty filter alarms can be stored with time and day recorded for better management of system maintenance needs. Alarms can be retrieved for report generation purposes.

Network Bridge - this option is used to isolate primary and secondary communication buses. This can be extremely useful to reduce the communication traffic between devices that frequently move large amounts of data. A Network Bridge is required when more than 32 CCS devices are connected on a CCN bus.

Network Repeater NAM - this option provides RS 232 to RS 485 communication conversion between computers and the Carrier Comfort Network. The Repeater is also used to extend bus lengths over 300 metres via RS 232 to RS 485.

Data-Link - this is a series of network options that allows CCN controller to interface with other Building Management Systems. These devices convert the CCN protocol to an industry standard protocol that can be supported by other BMS systems such as Staefa, Honeywell, Johnson and Landis & Gyr networks.