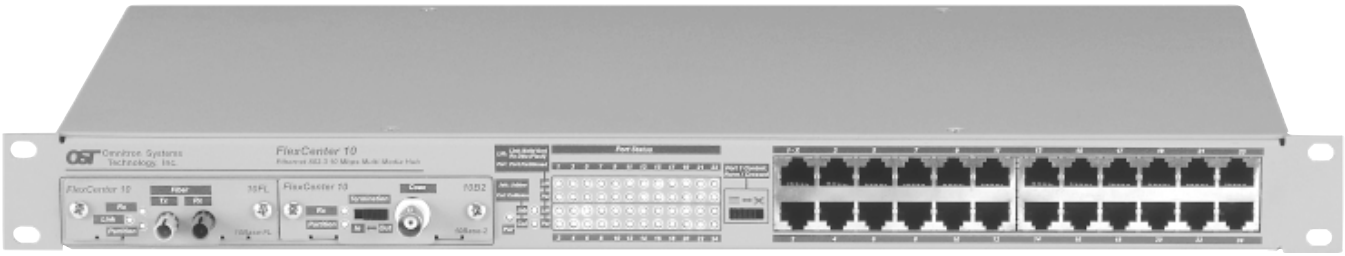
Omnitron Systems Technology, Inc.

FlexCenter™ 10

12/24 Port 10Base-T Ethernet Hub with Fiber and Coax Modules



FEATURES

- The FlexCenter™ 10 is a 12/24 port IEEE 802.3 compatible 10Base-T hub with two ports for optional interface modules.
- The FlexCenter can use any combination of two fiber and coax modules to provide an efficient LAN design.
- Supports EIA/TIA 568 unshielded twisted pair (UTP) categories 3, 4 and 5 wiring with a switch-selectable crossover uplink port.
- Features multimode (MM) and single-mode (SM) fiber modules to support different network layouts.
- Features a 50 ohm coax module with a switch-selectable internal termination for space and cost saving.
- Provides repeater functionality for enhanced reliability, including retiming, amplitude restoration, preamble regeneration and fragment extension.
- Detects and corrects port polarity reversals, and partitions defective ports for increased reliability.
- Provides LEDs for LAN support and management.

DESCRIPTION

The FlexCenter™ 10 is a 12/24 port 10Base-T workgroup hub repeater with two ports for optional interface modules. It supports the IEEE 802.3 standard and provides different media connectivity options.

The FlexCenter 10 is ideal as an inter-workgroup hub. Its 12 or 24 UTP ports make it ideal for different workgroup sizes, while its two interface module ports make it ideal for interconnecting workgroups across fiber or coax backbones.

The FlexCenter 10 enhances network reliability by its extensive functionality. The hub detects and corrects port polarity reversals. The hub also reconditions all data flowing through it: data is retimed and reshaped to its full signal amplitude; any lost preamble bits are restored; any packet fragments are extended; and any illegally-long packets are truncated. The hub monitors and detects collisions, and forces jamming bit streams to inform all ports about the collisions.

The FlexCenter 10 monitors each port for illegal operations. A port violating transmission rules is disconnected (partitioned); it is reconnected when normal behavior is restored.

Each of the 10Base-T ports supports EIA/TIA 568 unshielded twisted pair (UTP) categories 3, 4 and 5 and 100 ohm shielded

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twisted pair (STP) wiring. A crossover switch facilitates the use of a straight-through cable when connecting between hubs and eliminates the need for a crossed cable.

Several interface modules are available for different media options. Three fiber modules support the 10Base-FL standard. They use ST connectors and feature 850 nm and 1300 nm multimode modules and a 1300 nm single-mode module. The coax module supports the 10Base-2 standard. It uses a BNC connector, supports a 50 ohm cable and features switch-selectable cable termination. Per IEEE 802.3 standard, up to 30 workstations can be attached to the coax segment.

The FlexCenter 10 provides diagnostic data through LED indicators that assist in network installation and maintenance. The LEDs report power availability (Pwr), the detection of collisions (Col) and jabber (Jab) conditions. For each port the LEDs report the detection of connected devices (Link), data being received (Rx) and partitioning condition (Par).

The FlexCenter 10 is powered by an internal universal power supply and operates in office and wiring closet environments. It is self-configuring and is software-independent.

SAMPLE APPLICATIONS

The 5-4-3 Collision Rule

Collisions are an inherent part of Ethernet. Since a sending station may transmit at any time, its transmission may collide with transmissions from other stations. When a collision is detected, the sending station backs off, waits awhile and attempts to retransmit. This retransmission process is very efficient when performed by hardware. In a large network, if the data travel delay time between two stations is too long, a collision may occur without the sending station's hardware detecting it. Typically, a software function detects the loss of the sent data and initiates retransmission process. This retransmission process is very inefficient when performed by software.

The 5-4-3 collision rule was defined by the IEEE 802.3 standard as a set of criteria that when followed, will ensure the detection of collisions by hardware. The following paragraphs summarize the main criteria points.

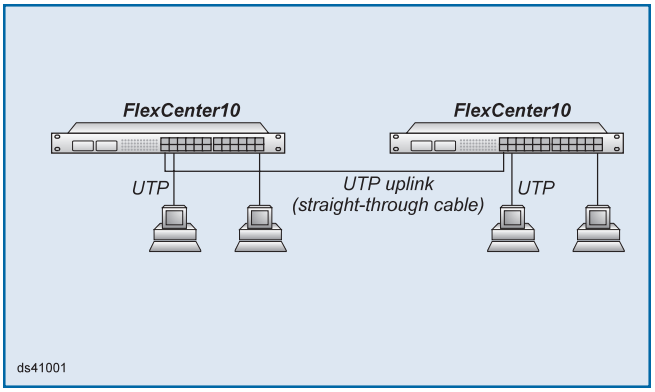
The main criterion dictates that two stations (DTEs) should not be separated by more than 5 segments and 4 repeaters. In the maximum configuration the following restrictions apply: (a) No more than 3 of the segments should be of a shared type (e.g. coax). (b) No fiber segments should exceed 500 m.

When two stations are separated by 4 segments and 3 repeaters the following restrictions apply: (a) Inter-repeater fiber segments should not exceed 1000 m. (b) Station to repeater segments should not exceed 400 m. There are no restrictions on using shared segments.

The 5-4-3 rule is an approximation. In large networks, or when specific distances are required, the reader is encouraged to use the IEEE 802.3 detailed calculation guidelines (not described here) or consult Omnitron's application engineering staff to assist in proper network design.

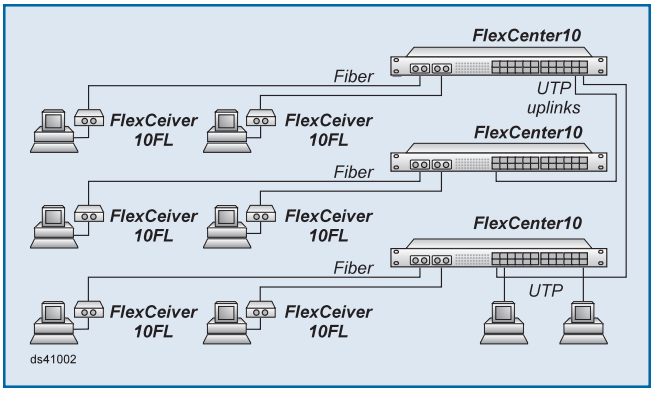
Application 1. Small Workgroup

This application depicts a basic 10Base-T two-hub configuration. The hubs are connected via a straight-through UTP patch cable with one hub selecting the "crossed-uplink" switch position. The 5-4-3 rule is met since only 3 segments, 2 repeaters and 0 shared media segments are used (3-2-0).



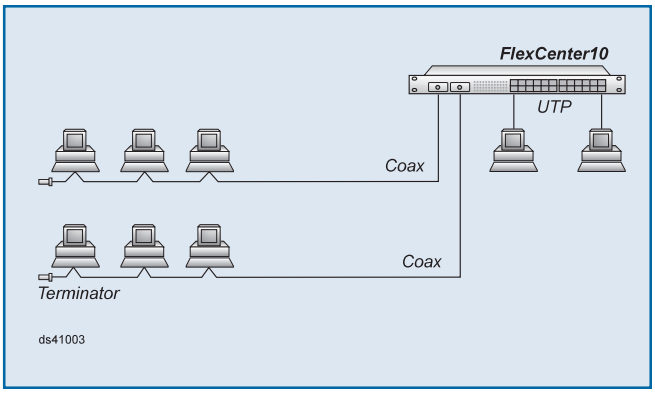
Application 2. Midsize Workgroup with Fiber Workstations

In this case two hubs are connected via uplink cables to a third hub. Six workstations are connected via fiber to the hubs. The worse collision path is between two stations connected to each of the lower hubs. In this case there are 4 segments, 3 repeaters and 0 shared segments (4-3-0). Therefore, limiting the fiber runs to 400 m satisfies the requirements of the collision rule.



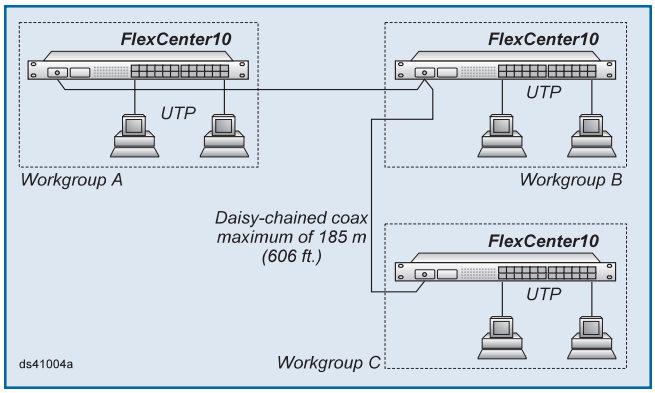
Application 3. Midsize Workgroup with Coax Segments

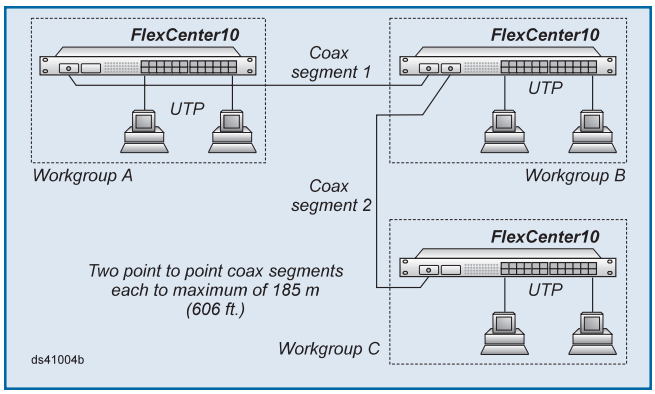
In this case the FlexCenter provides the central connection point among the coax and UTP segments. Note that the coax lines are terminated by the hub's coax modules. The longest collision path is between any two stations: 2 segments, 1 repeater and 2 shared segments (2-1-2); the collision criterion is met.



Application 4. Shared and Dedicated Coax Backbones

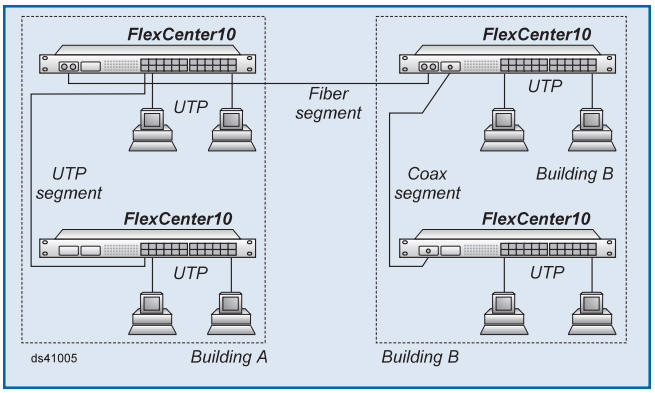
In these two cases, three wiring closets are connected via a coax backbone. In the first case, a coax is daisy-chained among the hubs. The maximum length of the coax segment is 185 m (606 ft.) and the collision rule is met (3-2-1). In the second case, by using two point to point coax segments, the distance of each segment can reach 185 m (606 ft.). The collision rule is met (4-3-2).





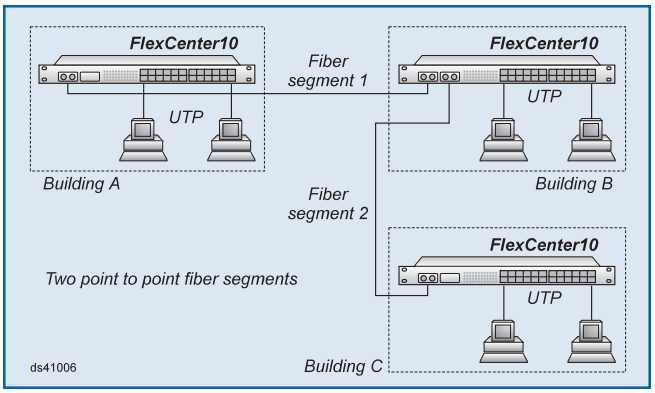
Application 5. Single Fiber Backbone

In this case, two buildings are connected using a 2 km fiber. The LAN in building A is interconnected via UTP and the LAN in building B is interconnected via coax. The collision rule is met (5-4-1) with a fiber distance limit at 500 m. A detailed calculation (not provided here) reveals that the 2 km fiber may be used.



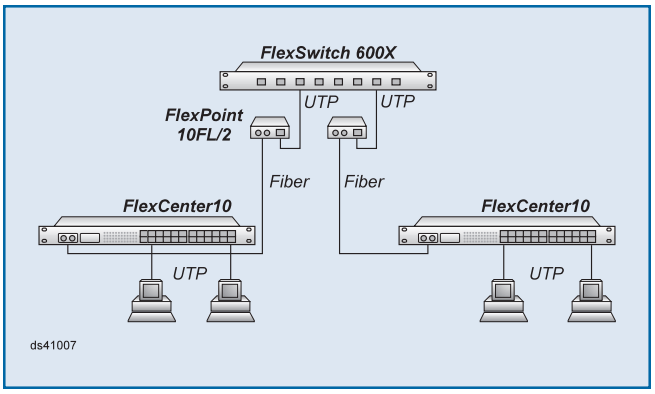
Application 6. Multiple Fiber Backbone

This case depicts three 10Base-T hubs interconnected using two fiber segments. The collision rule is met (4-3-0) while restricting each fiber segment to 500 m. A detailed calculation reveals (not provided here) that a total budget of 3,250 m of fiber is available which could allow for one of the fibers to be at 2 km while the other could be 1,250 m.



Application 7. Switched Fiber Backbone

This application depicts a switched fiber backbone with the FlexCenter hubs and the FlexPoint 10FL/T converters providing the fiber connectivity. Each "branch" segment radiating from the switch is a separate "collision domain" and the collision rules apply independently to each one. Each one of the branching LANs meets the collision rule (3-2-0).



SPECIFICATION

- **Protocol:** IEEE 802.3, 10Base-T, 10Base-FL, 10Base-2
- **Interface Connectors:**
  - **Hub**
    - **UTP:** (12/24) RJ45 pins 1-2, 3-6 active
  - **10FL Module:**
    - **Fiber Optic:** (1) ST
  - **10B2 Module:**
    - **Coax:** (1) BNC
- **Cable Types:**
  - **10Base-T UTP:** Categories 3, 4, 5 (EIA/TIA 568)
  - **MM fiber:** 50/125, 62.5/125, 100/140 µm
  - **SM fiber:** 9/125 µm
  - **10Base-2 Coax:** 50 ohm, RG-58A/U, RG-58C/U, RG-58/U or equivalent
- **Supported Distances:**
  - **10Base-T UTP:** 100 m / 328 ft.
  - **MM 850 nm fiber:** 2 km / 1.2 mi. / 6,560 ft.
  - **MM 1300 nm fiber:** 2 km / 1.2 mi. / 6,560 ft.
  - **SM 1300 nm fiber:** 2 km / 1.2 mi. / 6,560 ft.
  - **Coax:** 185 m / 606 ft.
- **Indicators:**
  - **Hub:**
    - **Power:** LED (1), Yellow, power applied
    - **Collision:** LED (1), Yellow, collision detected
    - **Jabber:** LED (1), Red, jabber condition
    - **UTP Link / Receive:** LED (12/24), Green: device present - solid; data received - blinking
    - **UTP Partition** LED (12/24), Red, port partitioned
  - **10FL Module:**
    - **Fiber Link:** LED (1), Green, device detected
    - **Fiber Receive:** LED (1), Green, data received
    - **Fiber Partition** LED (1), Red, port partitioned
  - **10B2 Module:**
    - **Coax Link:** LED (1), Green, device detected
    - **Coax Receive:** LED (1), Green, data received
- **Switches:**
  - **Hub:**
    - **UTP Crossover:** Straight / Crossed
  - **10B2 Module:**
    - **Coax Termination:** 50 Ohm In / Out
- **Dimensions / Weight:** W:19.0"xD:7.0"xH:1.75" / 7 lb.
- **Power:** 110 / 230 VAC, 50 / 60 Hz
- **Environmental:**
  - **Temperature:** 0 to 40 degrees C
  - **Humidity:** 0-90% (non-condensing)

ORDERING INFORMATION

Model	***Description***
Hubs	
4100-xy	*FlexCenter 10, 12 Ports, Rack-Mounted*
4101-xy	*FlexCenter 10, 12 Ports, Stackable*
4102-xy	*FlexCenter 10, 24 Ports, Rack-Mounted*
4103-xy	*FlexCenter 10, 24 Ports, Stackable*
Modules	
4110	*FlexCenter 10 Module, 10FL, Fiber, MM , 850 nm*
4111	*FlexCenter 10 Module, 10FL, Fiber, SM , 1300 nm*
4112	*FlexCenter 10 Module, 10FL, Fiber, MM , 1300 nm*
4120	*FlexCenter 10 Module, 10B2, Coax*
9200-ST2-3	*Fiber Optic Cable, ST, 3 ft., Duplex*
9300-P45-6	*Cat 5 Patch Cable, RJ45, 6 ft., Straight*

Factory-configured hubs with interface modules are available for models 4100, 4101, 4102, 4103. To specify a pre-configured hub, select modules by indicating the module code (below) in place of the letters x and y in the specific FlexCenter 10 model number (above):

Module Code	*Description*
0	*Blank, No Module*
2	*Module 4120, Coax, 10B2 Module*
3	*Module 4110, Fiber 10FL, MM, 850 nm module*
4	*Module 4111, Fiber 10FL, SM 1300 nm module*
5	*Module 4112, Fiber 10FL, MM 1300 nm module*

For a unit without any modules specify 0 for x and y (xy=00).

For assistance with configurations and for information about additional modules, consult factory.

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