

- a) All plenum Category 5 Unshielded Twisted Pair (UTP) cable will have eight 24-AWG copper conductors twisted into pairs and insulated with FEP and sheathed with ECTFE. Category 5 UTP will meet or exceed the following specifications:

- 4-pair Category 5 cabling
- UL Type CMP

Standard of Quality: Lucent Technologies 2061B+ cable required

- 2) Modular Category 5 UTP terminations:

- a) Terminate all Category 5 UTP cabling on 8-position/8-conductor modular outlets meeting or exceeding the following specifications:

Standard of Quality: Lucent Technologies MPS100BH required.

- 3) Modular Information Outlets Enclosures

- a) All work area UTP terminations will be enclosed in a surface-mounted plastic enclosure designed to support an all copper, all fiber, or mixed media environment.

Physical Specifications:

- Length: 6.9 in. (17.2 cm)
- Width: 5.6 in. (14.0 cm)
- Depth: 1.6 in. (4.10 cm)

Configuration:

- Provide and install with one blank panel and one panel equipped for four M-series UTP terminations and one blank dust cover.

Standard of Quality: Lucent Technologies 40A1 Multimedia Information Outlet required

## B. BACKBONE CABLING

1. The backbone cabling subsystem provides interconnection between telecommunications closets, equipment rooms, and entrance facilities. It consists of backbone cabling, intermediate and main cross-connects, patch cables, mechanical terminations, and intermediate or distribution racks and cabinets.

a. GENERAL

- 1) All backbone fiber optic cable used in the project will be plenum-rated.
- 2) All backbone fiber optic cable used in the project will be terminated on the specified equipment.
- 3) All backbone UTP cable used in the project will be plenum-rated.
- 4) All backbone UTP cable will be terminated on the specified 110 Jack Panel equipment.
- 5) For backbone Category 5 connections to electronic hardware, Contractor will provide one Category 5 UPTP patch cable for each work are enclosure + 15%.
- 6) For backbone fiber optic connections to electronic hardware, Contractor will provide multimode fiber optic patch cables for all backbone fiber terminations (both ends) + 15%.

b. HARDWARE SPECIFICATIONS

- 1) Backbone multimode fiber optic cables – Plenum

- a) Backbone fiber will meet or exceed the following specifications:

Physical Specifications:

- Fiber Dimensions:
  - 62.5nm – core
  - 125nm – cladding
  - 250nm – coating
  - 900mm – buffering
- Cable Minimum Bending Radius:
  - During Installation: 20 times cable diameter
  - After Installation: 10 times cable diameter

Optical Specifications:

- Maximum Fiber Loss: 4.0 dB/km at 850nm  
(typical range 3.0 to 3.5 dB/km)
- Maximum Fiber Loss: 1.5 dB/km at 1300nm  
(typical range 0.5 to 0.8 dB/km)
- Minimum Bandwidth: 200 MHz at 850nm
- 500 MHz at 1300nm
- Numerical Aperture: 0.275
- UL Listed Type OFNP
- ISO 9001 Certified Manufacturer
- 6-strand fiber optic cable

Standard of Quality: Lucent Technologies Accumax Building  
Cable LGBC-006D-LPX required.

2) Backbone UTP – Plenum(voice alternate)

- a) Backbone Category 3 UTP will meet or exceed the following specifications:

Specifications:

- Twisted Pairs: 50
- EIA/TIA Category: 3
- UL Listed Type CMP/MPP

Standard of Quality: Lucent Technologies Plenum 2010 Cable Required

C. WORK AREA SUBSYSTEM

1. The connection between the information outlet and the station equipment in the work area is provided by the Work Area Subsystem. It consists of cords, adapters, and other transmission electronics.

a. GENERAL

- 1) Contractor will supply all Work Area Subsystem wiring and/or cords that connect terminal devices to information outlets. This includes mounting cords and connectors to provide data connectivity to data terminal devices.
- 2) For the work area, Contractor will provide one Category 5 UTP patch cable for each work area enclosure + 15%.

b. HARDWARE SPECIFICATIONS

- 1) Category 5 Patch Cordage
  - a) Patch cords will be 24-AWG data cables with eight conductors. Both ends of the cord will be equipped with modular 8-position/8-conductor (RJ45-Type) plugs. Patch cords will meet or exceed the following specifications:

Specifications:

- Gauge: 24-AWG stranded wire
- Pair Size: Four (4)
- Length: 10 ft. (3.05 m)
- UL Listed Type CM

Standard of Quality: Lucent Technologies D8SA required.

D. TELECOMMUNICATIONS CLOSET/BDF

1. Telecommunications closets are used to connect backbone cabling from the MDF to electronic hardware and horizontal cabling. The telecommunications closet subsystem consists of terminating hardware, for backbone and horizontal fiber and copper cables, patch cabling and cabinet/rack mounts.

2. GENERAL

- a. Contractor will supply all Work Area Subsystem wiring and/or cords that connect Terminal Devices to information outlets. This includes mounting cords and connectors to provide data connectivity to data terminal devices.
- b. For the work area, Contractor will provide one (1) Category 5 patch cable for each work area enclosure + 15%.
- c. Patch panel installations will contain a retraining trough between every 100 pair termination block.
- d. The Contractor will provide any necessary connections, connector barrels, screws, anchors, clamps, tie wraps, distribution rings, wire molding, miscellaneous grounding and support hardware, etc., necessary to facilitate the installation of the system(s).
- e. Contractor will supply cross-connect wire, patch cords and fiber patch cords for cross-connection and inter-connection of termination blocks and lightguide interconnection units.
- f. Contractor will supply patch cord (factory assembled Plug-ended jumpers) for all patch panel terminal blocks
- g. The patch cord will be available in 1, 2, 3, and 4 pair versions with lengths of 2 through 9 feet (or custom length as required) and will meet or exceed the following electrical, mechanical and next specifications listed below:
- h. Contractor will supply cross-connected wire, patch cords and fiber patch cords for connections between the network center and backbone subsystem.
- i. When required by local code, provide a telecommunications Bonding Backbone utilizing a #6 AWG or larger bonding conductor that provides direct bonding between equipment rooms and telecommunications closets.

This is part of the grounding and bonding infrastructure of the telecommunications pathways and spaces in the building structure, and is independent of equipment or cable.

- j. Communication bonding and grounding will be in accordance with the NEC and NFPA. Horizontal cables will be grounded in compliance with the ANSI/NFPA 70 and local requirements and practices.
- k. Contractor will supply lightning protectors and wire used to ground the equipment for all cables exposed to potential lightning strikes.
- l. The Contractor will complete the termination of all transmission media in accordance with current industry standards (BICSI). The appropriate equipment will be supplied to make the complete Communications System functional and provide protection for the transmission media used.
- m. All Distribution cabinets/BDF hardware will be cabinet mounted in 48" enclosures.
- n. Cabling entering cabinets will be supported to prevent sagging and protected from abrasion, bends, kinks and other damage through the use of D-rings and raceway for routing, fitted gasket materials for cabinet penetrations and innerduct protection. Additional materials and techniques may be required.

## 1. HARDWARE SPECIFICATIONS

### o. Distribution Closet/BDF Cabinets

#### Physical Specifications:

- Dimensions: 48.00" H x 25.00" W x 26.00" D
- Floor mounted
- EIA 19" rack mounting
- Solid side panels
- Plexiglas front door with lock
- Adjustable rubber feet (set of 4 each cabinet)
- Color, blue, gray or white available with wood grain or black trim (color approved by Owner before ordering)
- EIA 19" front and rear mounting sliding tray (Model 7206 FRSL-A, one for each cabinet).

Standard of Quality: Great Lakes GL 480

### p. Backbone Copper Termination Block

- 1) The termination block for backbone copper cabling will provide both 110 and 8-position/8 conductor interface options for cross connects between backbone cabling and horizontal cabling. The termination block will meet or exceed the following specifications:

- IDC termination to 8-pin modular jack via printed wiring board
- EIA 19" rack mounting
- (UL) listed

Standard of Quality: Lucent Technologies 110 Modular Jack panel System required

q. Horizontal Category 5 UTP Cabling Patch panel

- 1) The Category 5 UTP cabling patch panel will provide MDF /BDF terminations for all horizontal Category 5 cabling. The patch panel will meet or exceed the following specifications:

Electrical Specifications:

- EIA/TIA Category: 5
- Wiring: EIA/TIA 568B options
- Integrated cable management retainers
- CIA 19" rack mounting

Standard of Quality: Lucent Technologies PatchMax Power Sum Modular Patch Panel required.

r. Category 5 Patch Cordage

- 1) Patch cords will be 24-AWG data cables with eight conductors. Both ends of the cord will be equipped with modular 8-position/8 conductor (RJ45-Type) Plugs. Patch cords will meet or exceed the following specifications:

Specifications:

- Gauge: 24-AWG stranded wire
- Pair Size: Four (4)
- Length: 5 ft. (3.05 m)
- UL Listed Type CM

Standard of Quality: Lucent Technologies D8SA required.

s. Multimode Fiber Optic Patch Cords

- 1) All multimode fiber optic cordage will be duplex cordage providing connection between the multimedia information outlet and terminal equipment. Cable will consist of tight buffered, graded-index fiber with a 62.5-micron core and a 125-micron cladding. Fiber will be covered with aramid yarn and a jacket of flame retardant PVC. Fiber optic patch cords will meet or exceed the following specifications:

**Optical Specifications:**

- Average Loss: 0.3 dB/mated connector
- Minimum Bandwidth: 200 MHz-km @ 850nm  
500 MHz-km @ 1300nm

**Mechanical Specifications:**

- Number of fibers 2
- Termination STII+/STII+
- UL Listed
- Length 5 ft. (3.05 m)

**Standard of Quality:** Lucent Technologies 3.0-mm multimode patch cords required.

**E. NETWORK CENTER/MDF**

1. The Telecommunications Closet Subsystem consists of wiring blocks for termination of copper cables or lightguide interconnection units (LIU) for the termination of optical fibers.

a. **GENERAL**

- 1) Patch panel installers will contain a retaining trough between every 100 pair termination block.
- 2) The Contractor will provide any necessary connections, connector barrels, screws, anchors, clamps, tie wraps, distribution rings, wire molding, miscellaneous grounding and support hardware, etc., necessary to facilitate installation of the system(s).
- 3) The Contractor will supply modular UTP patch cords and fiber patch cords for cross-connection and inter-connection of termination blocks and lightguide interconnection units.
- 4) Contractor will supply patch cord (factory assembled plug-ended jumpers) for all patch panel terminal blocks.
- 5) Contractor will supply modular UTP patch cords and fiber patch cords for connections between the network center and backbone subsystem.

- 6) When required by local code, provide a Telecommunications Bonding Backbone utilizing a #6 AWG or larger bonding conductor that provides direct bonding between equipment rooms and telecommunications closets. This is part of the grounding and bonding infrastructure (part of the telecommunications pathways and spaces in the building structure), and is independent of equipment or cable.
- 7) Communication bonding and grounding will be in accordance with the NEC and NFPA. Horizontal cables will be grounded in compliance with ANSI/NFPA 70 and local requirements and practices.
- 8) The Contractor will complete the termination of all transmission media in accordance with current industry standards (BICSI). The appropriate equipment will be supplied to make the complete Communications System functional and provide protection for the transmission media used.
- 9) All Network Center/MDF hardware will be cabinet mounted in 84' enclosures.
- 10) Cabling entering cabinets will be supported to prevent sagging and protected from abrasion, bends, kinks and other damage through the use of D-rings and raceway routing, fitted gasket material for cabinet penetrations and innerduct for protection. Additional materials and techniques may be required.

b. HARDWARE SPECIFICATIONS

- 1) Backbone Copper Termination Block
  - a) The termination block backbone copper cabling will provide both 110 and 8-position/8-conductor interface options for cross connects between backbone cabling and horizontal cabling. The termination block will meet or exceed the following specifications:
    - IDC termination to 8-pin modular jack via printed wiring board
    - EIA 19" rack mounting
    - All blocks will be Underwriter's Laboratories (UL) listed

Standard of Quality: Lucent technologies 110 Modular Jack Panel system required.

- 2) Lightguide Interconnection Unit (LIU) & Lightguide Distribution Shelf (LDS)

- STII+ terminations and connectors
- The LIU/LDS will provide terminating capability of 48 or 72 connectors

Standard of Quality: Lucent Technologies LXG required.

3) Horizontal Category 5 UTP Cabling Patch Panel

- a) The cat 5 UTP cabling patch panel will provide MDF/BDF terminations for all horizontal Category 5 cabling. The patch panel will meet or exceed the following specifications:

Electrical Specifications:

- EIA/TIA Category 5
- Wiring: EIA/TIA 568B
- Integrated cable management retainers
- EIA 19" rack mounting

Standard of Quality: Lucent Technologies PatchMax Power Sum Modular Patch Panel required.

4) Category 5 patch Cordage

- a) Patch cords will be 24-AWG data cables with eight conductors. Both ends of the cord will be equipped with modular 8-position/8-conductor (RJ45 Type) plugs. Patch cords will meet or exceed the following specifications:

Specifications:

- Gauge: 24-AWG stranded wire
- Pair Size: Four (4)
- Length: 10 ft. (3.05 m)
- UL Listed Type CM

Standard of Quality: Lucent Technologies D8SA required

5) Multimode fiber optic patch cords

- a) All multimode fiber optic cordage will be duplex cordage providing connection between the multimedia information outlet and terminal equipment. Cable will consist of tight buffered, graded-index fiber with a 62.5-micron core and a 125-micron cladding. Fiber will be covered with aramid yarn and a jacket of flame-retardant PVC. Fiber optic patch cords will meet or exceed the following specifications:

Optical Specifications:

- Average loss: 0.3dB/mated connector
- Minimum Bandwidth: 200 MHz-km @ 850nm  
500 MHz-km @ 1300nm

**Mechanical Specifications:**

- Number of fibers: 2
- Termination: STII+/STII+
- UL Listed
- Length: 10 ft (3.05 m)

Standard of Quality: Lucent Technologies 3.0 mm multimode patch cords required.

6) Network Center/MDF Cabinets:

**Physical Specifications:**

- Dimensions: 84.00"H x 29.00"W x 26.00" D
- Configured for EIA 19" rack mounting
- 16 position power strip circuit breaker and 12' cord
- Solid side panels
- Solid rear door with lock
- Fan assembly (3 fans with guards; 75 cfm/fan)
- Adjustable rubber feet (set of 4 for each cabinet)
- Color: Blue, gray or white available with wood grain or black trim (color approved by Owner before ordering)
- EIA 19' front mounting tray; 18" depth (Model 7206-FM; one for each cabinet)
- EIA 19" front and rear mounting sliding tray (Model 7206 FRSL-A; one for each cabinet)

Standard of Quality: Great Lakes GL 840 required.

F. BUILDING ENTRANCE

1. No building entrance facilities are required for this project.

**PART 3 – Execution**

A. EXAMINATION

1. Examine pathway elements to receive cable. Check raceways, cable trays and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Do not proceed with installation until unsatisfactory conditions have been corrected or directed to proceed.

## B. APPLICATION OF MEDIA

1. **Backbone Cable for Data Service:** Use two (2) 6-strand multimode fiber-optic cable conforming to technical specifications in Part 1 for runs between network center/MDF and wiring closets/BDF and for runs between wiring closets. Terminate all strands in specified 19" rack mount LIU.
2. **Backbone Cable for Voice Service:** Use 50-pair unshielded twisted pair cable conforming to technical specifications in Part 1 for runs between Network Center/MDF and wiring closets/BDF and for runs between wiring closets. Terminate both ends on specified 19" rack mount 110 Jack Panel block.
3. **Horizontal Copper Cables for Data Service:** Use unshielded twisted pair cable conforming to technical specifications in Part 1 for runs between wiring closets/BDF and workstation outlets. Terminate on modular outlets marked conforming to technical specifications in Part 1.
4. **Horizontal Cables for Voice Service:** Use unshielded twisted pair cable conforming to technical specifications in Part 1 for runs between wiring closets and workstation outlets. Terminate on modular outlets conforming to technical specifications in Part 2.

## C. INSTALLATION

1. **Wiring Method.** Install wiring in surface mount raceway except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where cable-wiring method may be used. Use UL-listed plenum cable conforming to technical specifications in Part 1 in environmental air spaces, including plenum ceilings. Conceal cable and raceway wiring except in unfinished spaces.
2. Use raceway types, sizes, and channels as required for each application, with fittings that match and mate with raceway.
3. Minimum raceway size: ¾-inch trade size.
4. Keep raceway at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
5. Join raceways with fittings designed and approved to connect joints.
6. All raceways, including adhesive backed, are to be secured to structure with appropriately sized screws, anchors, and washers spaced no more than every 18 inches.

7. Install components as indicated, according to manufacturers' written instructions. Use techniques, practices, and methods that are consistent with the Category 5 rating of the components and that assure Category 5 performance of completed and linked signal paths, end-to-end.
8. Install cable without damaging conductors, shield, or jacket.
9. The Contractor will not roll or store cable reels without an appropriate underlay and the prior approval of The Owner.
10. Do not bend cable in handling or installation to smaller radii than minimums recommended by manufacturers.
11. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
12. Pull cables simultaneously where more than one is being in the same raceway.
13. Use pulling compound or lubricant where necessary. Use compounds that will not damage conductor or insulation.
14. Use pulling means, including fish tape, cable, rope and basket weave wire/cable grips that will not damage media or raceway.
15. Install exposed cable and raceway parallel and perpendicular to surfaces or exposed structural members, and follow surface contours where possible. Diagonal or multiple parallel cable runs will not be accepted except where specified.
16. The Contractor will provide any necessary screws, anchors, clamps, tie wraps, distribution rings, wire molding, miscellaneous grounding and support hardware, etc., necessary to facilitate the installation of the system.
17. Contractor will secure and support all horizontal and backbone cabling with approved J-Hooks and D-rings spaces not less than 60" apart and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
18. Wiring within Wiring Closets and Enclosures: Provide adequate length of conductors. Train the conductors to terminal points with no excess. Use lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to radii smaller than allowed.

19. **Separation of Wires:** Comply with BICSI rules for separation of unshielded copper voice and data system cables from potential EMI sources, including electrical power lines and equipment.
20. **Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.**
21. **Group connecting hardware for cables into separate logical fields.**
22. **Use patch panels to terminate cables entering the space, except as otherwise indicated.**

#### **D. GROUNDING**

1. **Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common mode returns, noise pickup, cross talk, and other impairments.**
2. **Signal Ground Terminal:** Locate at each equipment room and wiring closet. Isolate from power system and equipment grounding.
3. **Signal Ground Bus:** Mount on wall of main equipment room with stand –off insulators.
4. **Signal Ground Backbone Cable:** Extend from signal ground bus to signal ground terminal in each wiring closet and equipment room.

#### **E. IDENTIFICATION**

1. **The Contractor will be responsible for printed labels for any cables and cords, distribution frames, and outlet locations, according to requirements of The Owner and these specifications. No labels are to be written by hand.**
2. **System:** Use a unique 3-syllable alphanumeric designation for each cable, and label the cable and the jacks, connectors, and terminals to which it connects with the same designation. Use logical and systematic designations related to the architectural arrangement of the facility.
  - **First syllable is to identify and locate the wiring closet or equipment room where the cable originates.**
  - **Second syllable is to identify and locate the cross-connect or patch panel field in which the cable terminates.**
  - **Third syllable is to designate the type of media (copper or fiber) and the position occupied by the cable pairs or fibers in the field.**

3. **Workstation:** Label cables within outlet boxes.
4. **Distribution Racks and Frames:** Label each unit and field within that unit.
5. **Within Connector Fields, in Wiring Closets and Equipment Rooms:** Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data service, use a different color for jacks and plugs of each service.
6. **Cables, Generally:** Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
7. **Exposed Cables and Cables in Cable Trays and Wire Troughs:** Label each cable at intervals not exceeding 15 feet (4.5 m).
8. **Cable Schedule:** Post at a prominent location in each wiring closet and equipment room. List incoming and outgoing cables and their designations, origins, and destinations. Protect with a rigid frame and clear plastic cover. Provide a diskette copy of final comprehensive schedules for the Project in the software and format selected by Owner.

#### F. CLEANING

1. On completion of system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damage finish, including chips, scratches, and abrasions.

#### G. DEMONSTRATION

1. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance. Train designated personnel in cable plant management operations, including changing signal pathways for different workstations, rerouting signal in failed cables, and extending wiring and establishing new workstation outlets. Include both classroom training and hands-on experience.
2. **Training Aid:** Use operation and maintenance manual material as an instructional aid. Provide copies of this material for use in the instruction.
3. Schedule training with Owner with at least 7 days advanced notice.

#### H. TESTING/INSPECTIONS

1. **Testing:** Upon installation of cable and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance. Remove temporary connections when tests have been satisfactorily completed.
  - **Copper Cable Procedures:** Inspect for physical damage and perform continuity and shorts. Use time-domain reflectometer with strip chart recording capability and anomaly resolution to within 12 inches (300 mm) in runs up to 1000 feet (300 m) in length. Test for faulty connectors, splices, and terminations. Link performance for UTP cables must meet minimum criteria of EIA/TIA-568; including but not limited to wire map (open/short, polarity reversal, pair transposition), length, attenuation, DC loop resistance, NEXT, Power Sum NEXT.
  - **Fiber-Optic Cable Procedures:** Perform continuity and attenuation testing on all fiber strands (backbone and horizontal) at 850nm and 1300nm. Certify compliance with test parameters and manufacturer's recommendations.
2. **Correct malfunctioning units at site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.**
3. **Testing of all cabling will be performed as the system is installed. 100 percent (100%) of the wire pairs will be tested as specified. Voice, data, and wiring pairs will be tested from the information outlet device to the MDF or BDF termination (Basic Link testing). 100 percent of the fiber optic strands will be tested for continuity and attenuation (from the information outlet device to the MDF or BDF termination (Basic Link testing). Test results must be submitted to The Owner and/or Owner's representatives on a weekly basis until completion of the project.**
4. **On-going inspections will be performed during construction by the manager and the following points will be examined:**
  - a. **Is the design documentation complete?**
  - b. **Have all terminated cables been tested for continuity and shorts?**
  - c. **Have the pathway manufacturer's guidelines been followed?**
  - d. **Have the Contractors avoided excessive cable bending?**
  - e. **Have potential EMI sources been considered?**
  - f. **Is Cable Fill Correct?**
  - g. **Are hanging supports within 1.5 meters (5 feet)?**
  - h. **Does hanging cable exhibit some sag?**
  - i. **Have Patch Panel/110 Block instructions been followed correctly?**
    - **Jacket removal point?**
    - **Termination positions?**
    - **All pair terminations tight with minimal pair distortions?**

- Twists maintained up to Index Strip
  - j. Are connectors properly turned right side up in the Patch Panels and work area enclosures without cables wrapped or twisted around the Mounting Collars?
  - k. Are the correct outlet connectors used?
  - l. Is the jacket maintained right up to the modular outlets?
  - m. Have recommended fiber optic bend radius been observed?
5. The Contractor will record for each cable run, the actual cable distance in feet. Information will be included in system documentation.

**I. CABLING WARRANTY**

1. The Contractor will supply the Owner with registration from the manufacturer for product warranty.

**ACCEPTANCE AND RELIABILITY TESTING**

1. The Contractor will be responsible for completing all testing required by the specifications and manufactures certification prior to submitting a request to enter into the Acceptance and Reliability Test phase of the project.
2. The first phase of project completion is Acceptance Testing.
- a. To begin Acceptance testing for each phase, the Contractor must notify Owner, that the installation is considered 100% complete and all required testing is complete.
  - b. The Contractor will provide three (3) copies of all cross connect documentation in printed form, and two (2) sets of computer files of cross connect documentation on 3.5 inch disks in Microsoft Excel. The exact format will provided by the School District.
  - c. Owner will verify that the system is 100% complete and ready for operation. Verification process will be as follows:
    - The Contractor will accompany The Owner verify published test results provided by Contractor. The Contractor will supply necessary calibrated test equipment and operating technicians for verification walk-through.
    - The Owner will choose cables for testing verification. Number and location of cables and time required for testing will be at the sole discretion of The Owner.

- Multiple failures or significant deviation (fiber loss > 10%, UTP tests 2%) from published test results will result in complete system retest. The Owner reserves the right to request a complete retest of the system by an independent testing agent, at Contractor's expense. Contractor will replace and/or repair all cables found to be defective.
  - d. Upon verification that the system is 100% operational, the Owner will recommend to the board that the retainage for the Acceptance Test phase be paid to the Contractor.
3. **Product and Installation Warranties.** The warranty for all products and installation will begin on the date of Final Acceptance Test Certification by The Owner.

**SERVER SPECIFICATIONS**  
**Attachment G**

# Netfinity 7100 M10 11Y

## Quantity 2

### Base Model Features and Specifications

Netfinity 7000 M10 11Y

Rack

Pentium® III XEON 550/100MHz w/512K Cache

512MB ECC CHIPKILL DIMM MEMORY

Dual Channel Wide Ultra SCSI Controller

Netfinity Manager Software Included

Advanced System Management PCI Adapter Included

1.44MB Floppy Disk Drive

40X-17X IDE CD-ROM Drive

Two 400W Redundant Power Supplies Included

SystemXtra®

Remote Connect

MoST Connect

Update Connector

90-day IBM Start Up Support

3-year limited on-site warranty

3 Years Parts & Labor, Next Business Day Service Response

**Part No**

868011Y

### Accessories and Options Selected

Rack to Tower Conversion Kit

01K8005

IBM Netfinity 18.2GB Wide Ultra SCSI Hot Swap SL HDD

02K0440

IBM Netfinity 18.2GB Wide Ultra SCSI Hot Swap SL HDD

02K0440

IBM Netfinity 18.2GB Wide Ultra SCSI Hot Swap SL HDD

02K0440

Netfinity 10/100 Ethernet 32-bit Adapter

34L0901

APC Smart-UPS 3000 RMB

94G6676

G54 Color Monitor 15" (13.7" Viewable Image Size), stealth black

65464AN

Preferred Keyboard (stealth black)

28L3621

Sleek 2-Button Stealth Black Mouse

28L3673

# Netfinity 5500 M10 51Y

Quantity 25

**Base Model Features and Specifications**

Netfinity 5500 M10 51Y

Tower

Pentium® II XEON 550/100MHz w/512KB L2 ECC Cache

256MB 100MHz ECC REGISTERED SDRAM

Integrated Dual Channel ServeRAID II Ultra SCSI Controller

Integrated 10/100 Ethernet

Integrated Advanced System Management Processor

Netfinity Manager Software Included

1.44MB Floppy Disk Drive

32X-14X IDE CD-ROM Drive

3-year limited on-site warranty

90-day IBM Start Up Support

Update Connector

MoST Connect

Remote Connect

SystemXtra® 4

400W Hot-Plug Power Supply included

Keyboard included

Mouse included

3 Years Parts & Labor, Next Business Day Service Response 5

**Part No**

866151Y

**Accessories and Options Selected**

IBM Netfinity 9.1GB Wide Ultra SCSI SCA-2 SL HDD

01K8053

IBM Netfinity 9.1GB Wide Ultra SCSI SCA-2 SL HDD

01K8053

IBM Netfinity 9.1GB Wide Ultra SCSI SCA-2 SL HDD

01K8053

G54 Color Monitor 15" (13.7" Viewable Image Size), stealth black

65464AN

APC Smart-UPS 1400

94G3136

## Network Operating System Specifications

<u>Product</u>	<u>Users</u>	<u>Qty.</u>	<u>Cost</u>
Novell Netware 5.0	1000	1	
Novell Netware 5.0	350	1	
Novell Netware 5.0	250	24	

**EXHIBIT E**

**SONACOM**  
*IT PARTNERS*



# COSTS SUMMARY SHEET

Attachment (A)

Vendors: Complete and submit this page as the first page of your response.

Item Number	Description	Equipment Costs	Installation & Configuration	Cabling Costs	Other (provide details)
1	Board of Education Building Network Operation Center	\$462,784	\$21,021	\$46,666	
2	Alta Sita 26th & Bond Ave	\$291,750	\$6,835	\$38,888	
3	Attucks 2600 Kansas Avenue	\$253,534	\$4,617	\$28,888	
4	Brown 4901 Market Street	\$255,216	\$4,839	\$29,888	
5	Davis 725 N. 15th Street	\$306,428	\$7,722	\$42,888	
6	Dunbar 1900 Tudor Avenue	\$306,428	\$7,722	\$42,888	
7	Edgemont 8601 Washington Street	\$262,393	\$5,061	\$30,888	
8	Harding 731 N 74th Street	\$288,080	\$6,613	\$37,888	
9	Hawthorne 1600 N 40th Street	\$327,039	\$10,296	\$50,888	
10	Jackson 1798 Summit Avenue	\$251,872	\$6,170	\$35,888	
11	Jones 1601 Cleveland Avenue	\$262,393	\$5,061	\$30,888	
12	Lilly-Freeman 1300 Broadway Avenue	\$291,750	\$6,835	\$38,888	
13	Lucas 1620 Russell Avenue	\$262,393	\$5,061	\$30,888	
14	Mandela 1800 N. 25th Street	\$288,080	\$6,613	\$37,888	

Item Number	Description	Equipment Costs	Installation & Configuration	Cabling Costs	Other (provide details)
15	<b>Manners</b>	\$291,750	\$6,835	\$38,888	
16	<b>Morrison</b> 630 N. 59th Street	\$299,089	\$7,279	\$40,888	
17	<b>McHenry</b> 2700 Summit Avenue	\$291,750	\$6,835	\$38,888	
18	<b>Neely</b> 4400 Grand Avenue	\$266,063	\$5,238	\$31,888	
19	<b>Park Annex</b> 25th & Ridge Avenue	\$255,054	\$4,617	\$28,888	
20	<b>Robinson</b> 1435 Market Avenue	\$262,393	\$5,061	\$30,888	
21	<b>Wilson</b> 4817 Hallows Avenue	\$288,080	\$6,613	\$37,888	
22	<b>Clark Jr. High</b> 3310 State Street	\$363,247	\$10,740	\$52,888	
23	<b>Landsdowne Jr. High</b> 3939 Casey ville Avenue	\$363,247	\$10,740	\$52,888	
24	<b>Lincoln Jr. High</b> 1211 Bond Avenue	\$428,179	\$13,979	\$73,888	
25	<b>East St. Louis Sr. High</b> 4901 State Street	\$724,587	\$30,882	\$167,333	
26	<b>Early Childhood Center</b> 10th & Ohio Avenue	\$255,054	\$4,617	\$28,888	
27	<b>Other</b>	\$1,009,587	\$193,200		
28	<b>Total Proposed Price</b>	<b>\$9,208,220</b>	<b>\$606,100</b>	<b>\$1,148,338</b>	