

6.3. Grading the Cabling System

6.3.1. Residential Cabling Standards

The main standard, governing design, installation and performance aspects of a residential cabling system is ANSI/TIA -570-B. The current version of the standard, ANSI/TIA-570-B (published on April 29th, 2004) replaces earlier version, ANSI/TIA/EIA-570-A, published in September 1999. The current version of the standard includes refined versions of all three addendums to ANSI/TIA/EIA-570-A:

Addendum 1 – Security Cabling for Residences
Addendum 2 – Control Cabling for Residences
Addendum 3 – Whole-Home Audio Cabling for Residences

The standard establishes common terminology, types of cable media that can be used in residential cabling, design guidelines for single- and multi-dwelling residential units, as well as general requirements for installation and field testing of the residential cabling system.

Other standards that contain applicable information include

ANSI/TIA/EIA-568-B.1-2001 Commercial Building Telecommunications Cabling Standard; Part 1:
General Requirements
ANSI/TIA/EIA-568-B.2-2001, Commercial Building Telecommunications Cabling Standard; Part 2:
Balanced Twisted-Pair Cabling Components
ANSI/TIA/EIA-568-B.3-1999, Optical Fiber Cabling Components Standard
ANSI/TIA-569-B-2003, Commercial Building Standard for Telecommunications Pathways and Spaces
ANSI/TIA/EIA-606-A-2002, Administration Standard for Commercial Telecommunications Infrastructure
Other standards and regulations, including ANSI, IEC and ATIS specifications on different style connectors, used in a residential cabling system

Although the ANSI/TIA -570-B standard contains a lot of practical and useful information about performance aspect of a residential cabling system, it does not address all safety issues, associated with installation and use of such system, and, therefore, has to be supplemented by using of governing safety codes, such as National Electrical Code (NEC) and other local codes.

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6.3.2. Residential Cabling Media

Before we go into details about different grades of the cabling system, we need to define different categories of cable that these grades are based upon.

Category 3 – 4 pair UTP (Unshielded Twisted Pair) cable with performance characteristics guaranteed within 16 megahertz (MHz) frequency range

Category 5E – 4 pair UTP (Unshielded Twisted Pair) cable with performance characteristics guaranteed within 100MHz frequency range

Category 6 – 4 pair UTP (Unshielded Twisted Pair) cable with performance characteristics guaranteed within 250MHz frequency range

RG6 – 0.275 inch diameter coaxial cable with characteristic impedance 75Ω, usually specified by manufacturers within 2GHz frequency range

More detailed information about characteristics of different categories of cables is presented below.

Note:

The user is advised to refer to equipment manufacturer's requirements when planning a cabling system for specific home automation and security systems.

To make the design process simple, the TIA-570-B standard establishes a grading system based on telecommunications services that are or may be needed by the homeowner or tenant today and in the future.

The grading system establishes two Grades: Grade 1 and Grade 2.

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6.3.3. Description of Grade 1

Grade 1 specifies the minimum requirements for telecommunications services and provides for basic telephone and video application support. It also specifies required topology for the cables.

The basic requirements for Grade 1 residential cabling systems are summarized in the Table 1.

Feature	Description
Supported Services:	Telephone, fax, modem; Satellite TV; Cable and Antenna Television; Data (up to 1000 Mbit/s with Category 5E cabling, up to 10Gbit/s with Category 6 cabling*). *-10Gbit/s based on IEEE standards no yet approved at the time of this publication
Recognized Cable Types:	Category 5E (CAT5E) 4-pair UTP cable and components; Category 6 (CAT6) 4-pair UTP cable and components; 75-Ohm RG-6 coaxial cable and components. 75-Ohm RG59 coaxial cable for closed-circuit television (CCTV, commonly referred to as security video) only
Topology:	Star
Minimum requirements per outlet location:	1 x 4-pair Category 5E UTP cable (Category 6 recommended); 1 x 75-Ohm RG-6 coaxial cable.

Table 1 Features of Grade 1 Wiring

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Grade 1 provides the following functionality:

Distributing incoming phone lines to multiple rooms;
Building a high-speed home LAN with speeds up to 1000 Mbit/s;
Viewing antenna and cable TV at multiple outlet locations;
Viewing satellite TV at an outlet location where the satellite receiver is placed.

Grade 1 does not provide the following functionality:

- Using one outlet location for voice and data at the same time;
- Whole-house video distribution from internally generated sources (like VCR, DVD, satellite receiver);
- Whole-house audio distribution;
- Whole-house infrared control signal distribution;

Because of the limitations, Grade 1 wiring is not recommended for a “Smart Home”.

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6.3.4. Description of Grade 2

Grade 2 wiring supports advanced telecommunications applications such as high-speed Local Area Networks (LANs), multimedia, Internet etc and is recommended for a “Smart House”.

The basic requirements for Grade 2 residential cabling systems are summarized in the Table 2.

Feature	Description
Supported Services:	Telephone, fax, modem; Satellite TV; Cable and Antenna Television; Data (up to 1000 Mbit/s with Category 5E cabling, up to 10Gbit/s with Category 6 cabling*); Video monitoring; Video intercom and teleconferencing; Other multimedia applications. *-10Gbit/s based on IEEE standards no yet approved at the time of this publication VCR , DVD and laser disc output distribution;
Recognized Cable Types:	Category 5E (CAT5E) 4-pair UTP cable and components; Category 6 (CAT6) 4-pair UTP cable and components; 75-Ohm RG-6 coaxial cable and components. 75-Ohm RG59 coaxial cable for closed-circuit television (CCTV, commonly referred to as security video) only ; Fiber optic cables and components (50/125µm; 62.5/125µm multimode as well as singlemode)
Topology:	Star.
Minimum requirements per outlet location:	2 x 4-pair Category 5E UTP cable (Category 6 recommended); 2 x 75-Ohm RG-6 coaxial cable; 1 x 2-fiber optical fiber cable (optional).

Table 2 Features of Grade 2 Wiring

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Grade 2 provides all the benefits mentioned in Section 4 “Benefits of Advanced Residential Cabling” except for:

- Whole-house infrared control signal distribution;
- Whole-house audio distribution.

Cable types and outlet locations for the above mentioned applications are different and have to be planned separately from the rest of the cabling system.

Grade 2 wiring is the Recommended Solution for a Smart Home.

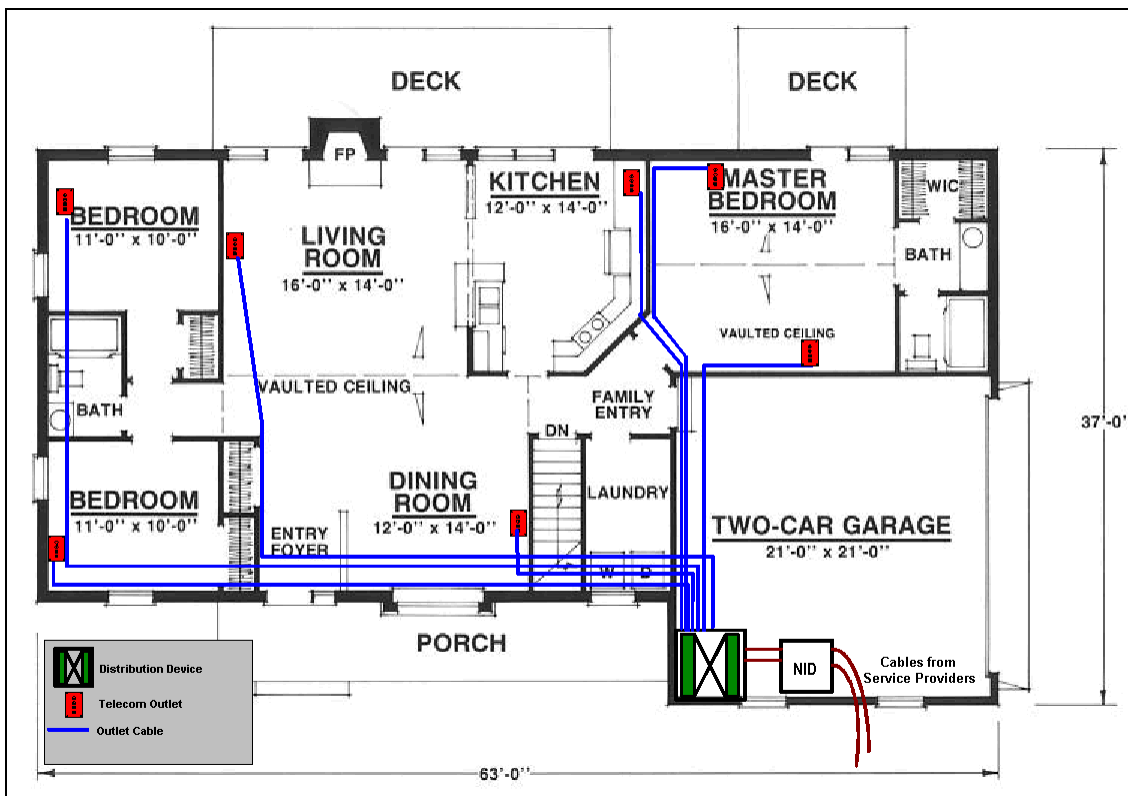


Figure 4 Example of a Residential Telecommunications Cabling System

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