BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Computing Skills

Session: 2019-20 (Summer Semester)

B. Voc. Program, 3rd Semester

1st In-Sem. Examination

ITN1303 Basics of Network Security

Time: 1 Hour

Max. Marks: 20

Instruction: Answer All Questions

Section – A

05X01 = 05 Marks

Q1. Which one of the following port is not used by Trojans?
a) UDP b) TCP
c) SMTP d) MP

Q2. Which one of the following is not an objective of network security?
a) Identification b) Access control
c) Authentication d) Lock

Q3. Which one of the following is a part of network identification?
a) User ID b) OTP
c) Password d) Fingerprint

Q4. Which one of the following is an example of physical hacking?
a) Remote Unauthorized access b) SQL Injection on SQL vulnerable site
c) Inserting malware loaded USB to a system d) DDoS (Distributed Denial of Service)

Q5. Which one of the following provides malicious users remote control over the targeted computer?
a) DDoS-Trojan b) Trojan-Banker
c) Backdoor Trojan d) Trojan-Downloader

Section – B

03X02 = 06 Marks

Q1. What is the need of security in a network?

Q2. What is Accountability? Discuss.

Q3. What is Malware? Give examples.

Section – C

03X03 = 09 Marks

Q1. Give the differences between Viruses, Worms and Trojans?

Q2. What is CIA? Explain.

Q3. What are the distribution channels for Malware? Explain.

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Section – B

03X02 = 06 Marks

Q1. What is the need of security in a network?

Ans. Network Security is a branch of computer science that involves in securing a computer network and network infrastructure devices to prevent unauthorized access, data theft, network misuse, device and data modification. Another function of Network Security is in preventing DoS (Denial of Service) attacks and assuring continuous service for legitimate network users.

Q2. What is Accountability? Discuss.

Ans. Accountability is an essential part of an information security plan. The phrase means that every individual who works with an information system should have specific responsibilities for information assurance.

Q3. What is Malware? Give examples.

Ans. Malware, "malicious software", is software developed for the purpose of doing harm. Malware can be classified based on how they get executed, how they spread, and/or what they do. Examples - Viruses, Worms and Trojans

Section – C

03X03 = 09 Marks

Q1. Give the differences between Viruses, Worms and Trojans?

Ans.

BASIS FOR COMPARISON	VIRUS	WORM	TROJAN HORSE
Meaning	A computer program that connects itself to another legitimate program to cause harm to the computer system or the network.	It eats resources of a system to bring it down rather than performing destructive actions.	It permits an intruder to obtain some confidential information about a computer network.
Execution	Depends on the transfer of a file.	Replicates itself without any human action.	Downloaded as software and executed.
Replication occurs	Yes	Yes	No
Remotely controlled	No	Yes	Yes
Rate of spreading	Moderate	Faster	Slow
Infection	Initiates by attaching a virus to an executable file.	Utilizes system or application weaknesses.	Attaches itself to a program and interpret as useful software.
Purpose	Modification of the information.	Halt the CPU and memory.	Steals the user's information.

Q2. What is CIA? Explain.

Ans. The CIA (Confidentiality, Integrity, and Availability) triad of information security is an information security benchmark model used to evaluate the information security of an organization. The CIA triad of information security implements security using three key areas related to information systems including confidentiality, integrity and availability.

- Confidentiality: Ensures that data or an information system is accessed by only an authorized person. User Id's and passwords, access control lists (ACL) and policy based security are some of the methods through which confidentiality is achieved.
- Integrity: Integrity assures that the data or information system can be trusted. Ensures that it is edited by only authorized persons and remains in its original state when at rest. Data encryption and hashing algorithms are key processes in providing integrity.

•Availability: Data and information systems are available when required. Hardware maintenance, software patching/upgrading and network optimization ensures availability.

Q3. What are the distribution channels for Malware? Explain.

Ans. Malware typically comes via the following distribution channels to a computer or network:

- Drive-by download—Unintended download of computer software from the Internet
- Unsolicited email —Unwanted attachments or embedded links in electronic mail
- Physical media—Integrated or removable media such as USB drives
- Self-propagation—Ability of malware to move itself from computer to computer or network to network, thus spreading on its own

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School of Computing Skills

Session: 2019-20 (Summer Semester)

B. Voc. Program, III Semester

1st In-Sem. Examination

ITN1305 Optical Fiber Communication

Time: 1 Hour
Max. Marks: 20

Section – A 05X01 = 05 Marks

Q1. Which one of the following is the Minimum Bend Radius for cables being installed under tension?

a. **20 times** the outside diameter of the cable
c. **10 times** the outside diameter of the cable

b. **20 times** the inside diameter of the cable
d. **10 times** the inside diameter of the cable

Q2. Which one of the following gives the base color, position and tracer for **D/BL** in a fiber cable?

a. Blue, 13, Black Tracer
c. Red, 19, Black Tracer

b. Yellow, 35, Double Black Tracer
d. Aqua, 36, Double Black Tracer

Q3. Which one of the following is used as a cable jacket material?

a. Low Smoke Zero Halogen (LSZH) plastics
c. Aramid yarn

b. Hard-clad silica
d. All of these

Q4. Which one of the following wavelengths is used by Single Mode Fiber (SMF)?

a. 850 nm b. 1900 nm c. 900 nm d. 1550 nm

Q5. Which one of the following is an installation hardware for optical fiber?

a. Pull eye b. OTDR c. Cleaver d. Connector

Section – B 03X02 = 06 Marks

Q1. Compare plenum, riser and general purpose cables.

Q2. What are the different core/cladding sizes of optical fiber cables?

Q3. What are bending losses? Discuss.

Section – C 03X03 = 09 Marks

Q1. Draw a cross-section of a fiber optic cable and explain the purpose of each segment.

Q2. Explain how and when a fan-out / breakout kit is used.

Q3. Compare the following methods used to install a fiber optic cable:

Tray and duct, direct burial, blown optical fiber.

ITN1305 Ans Section – A

05X01 = 05 Marks

Q1. Which one of the following is the Minimum Bend Radius for cables being installed (under tension)?

a. 20 times the nominal outside diameter of the cable

Q2. Which one of the following gives the base color, position and tracer for **D/BL** in a fiber cable?

a. Blue, 13, Black Tracer

Q3. Which one of the following is used as a cable jacket material?

a. Low Smoke Zero Halogen (LSZH) plastics

Q4. Which one of the following wavelength is used by Single Mode Fiber (SMF)?

d. 1550 nm

Q5. Which one of the following is an installation hardware for optical fiber?

a. Pull eye

Section – B

Q1. A plenum is a building space, compartment, duct or chamber used for air flow or to form part of an air distribution system. A plenum is a space used to move air to workspaces for the purpose of ventilation, heating or cooling. The informal words for plenums are "air duct" and "air return".

A riser is a floor opening, shaft, or duct that runs vertically through one or more floors. Riser cable is intended for use in vertical shafts that run between floors. Many buildings have a series of equipment rooms that are placed vertically in a reinforced shaft for the purpose of enclosing power distribution equipment, HVAC units, telephone distribution and other utility services throughout the building.

Or

Plenum cable Plenum cables, whether conductive or nonconductive, are suitable for use in ducts, plenums, and other space used for environmental air. These cables will have fire resistance and low smoke-producing characteristics.

Riser cable Riser cables, whether conductive or nonconductive, are suitable for a vertical run in a shaft or from floor to floor. These cables will have fire-resistance characteristics capable of preventing the carrying of a fire from floor to floor.

General-purpose cable General-purpose cables, whether conductive or nonconductive, are resistant to the spread of fire. However, these cables are not suitable for plenum or riser applications.

A general purpose area is all other area that is not plenum or riser, which is on the same floor.

Q2. **Core**

- The *core*, which carries the light, is the smallest part of the optical fiber.
- Optical fiber cores are manufactured in different diameters for different applications. Typical glass cores range from as small as 3.7um up to 200um. Core sizes commonly used in telecommunications are **9um, 50um and 62.5um**. Plastic optical fiber cores can be much larger than glass. A popular plastic core size is 980um.

Cladding

- The *cladding* is surrounding the core and providing the lower refractive index to make the optical fiber work.
- When glass cladding is used, the cladding and the core are manufactured together from the same silicon dioxide-based material in a permanently fused state.
- The manufacturing process adds different amounts of dopants to the core and the cladding to maintain a difference in refractive indexes between them of about 1%.
- The coating is solely protective. It does not contribute to the light-carrying ability of the optical fiber in any way. The outside diameter of the coating is typically either **250um or 500um.** Generally, the coating is colourless. In some applications, however, the coating is coloured, so that individual optical fibers in a group of optical fibers can be identified.

Q3. Bending loss

The loss which exists when an optical fiber undergoes bending is called bending losses.

Macrobending Loss

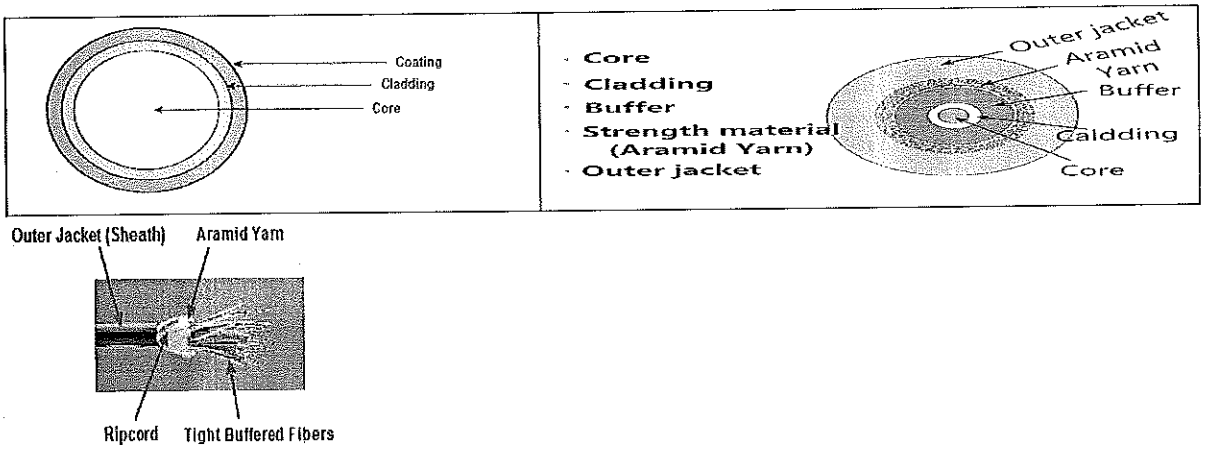
Macrobending happens when the fiber is bent into a large radius of curvature relative to the fiber diameter (large bends). These bends become a great source of power loss when the radius of curvature is less than several centimeters.

Microbending Loss

Microbendings are the small-scale bends in the core-cladding interface. These are localized bends can develop during deployment of the fiber, or can be due to local mechanical stresses placed on the fiber, such as stresses induced by cabling the fiber or wrapping the fiber on a spool or bobbin.

Section – C

Q1. Optical fiber components-:



A typical optical fiber comprises three main components: the core, which carries the light; the cladding, which surrounds the core with a lower refractive index and contains the light; and the coating, which protects the fragile fiber within.

Core

- The *core*, which carries the light, is the smallest part of the optical fiber.
- The optical fiber core is usually made of glass, although some are made of plastic. The glass used in the core is extremely pure silicon dioxide (SiO2). In the manufacturing process, dopants such as germania, phosphorous pentoxide, or alumina are used to raise the refractive index under controlled conditions.
- Optical fiber cores are manufactured in different diameters for different applications. Typical glass cores range from as small as 3.7um up to 200um. Core sizes commonly

used in telecommunications are **9um, 50um and 62.5um**. Plastic optical fiber cores can be much larger than glass. A popular plastic core size is 980um.

Cladding

- The *cladding* is surrounding the core and providing the lower refractive index to make the optical fiber work.
- When glass cladding is used, the cladding and the core are manufactured together from the same silicon dioxide-based material in a permanently fused state.
- The manufacturing process adds different amounts of dopants to the core and the cladding to maintain a difference in refractive indexes between them of about 1%.

Coating

- The *coating* is the true protective layer of the optical fiber.
- The coating absorbs the shocks, nicks, scrapes, and even moisture that could damage the cladding. Without the coating, the optical fiber is very fragile. A single microscopic nick in the cladding could cause the optical fiber to break when it's bent. Coating is essential for all-glass fibers, and they are not sold without it.
- The coating is solely protective. It does not contribute to the light-carrying ability of the optical fiber in any way. The outside diameter of the coating is typically either **250um or 500um.** Generally, the coating is colourless. In some applications, however, the coating is coloured, so that individual optical fibers in a group of optical fibers can be identified.

Buffer

The main function of the buffer is to protect the fiber from damage.

Jacket

Fiber optic cable's jackets are available in different colours that can easily make us recognize the exact colour of the cable we are dealing with. The colour yellow clearly signifies a single mode cable, and orange colour indicates multimode.

Aramid Yarn Aramid yarn is a yellow color, fiber looking material. It is strong and is used to bundle and protect the loose tubes or fibers in the cable. It is the strength member to provide tensile strength along the length of the cable during and after installation. When a cable is pulled into a duct, the tension is applied to the aramid yarn instead of the fibers.

Central Strength Member Many fiber optic cables has a central strength member, made of steel, fiberglass or aramid yarn. Central strength members are needed to provide the rigidity to keep the cable from buckling. Central strength members are common in outdoor cables and some high fiber counts indoor cables.

Gel Compound Gel compound fills buffer tubes and cable interiors, making the cable impervious to water. It needs to be completely cleaned off when the cable end is stripped for termination.

Ripcord Ripcord is a thin but very strong thread embedded just below the cable jacket. Its role is to split the cable easily without harming cable interiors.

Q2. Fiber fan out kit is used to terminate large fiber counts fiber cables.

WHERE ARE FAN OUT KIT AND BREAKOUT KIT USED?

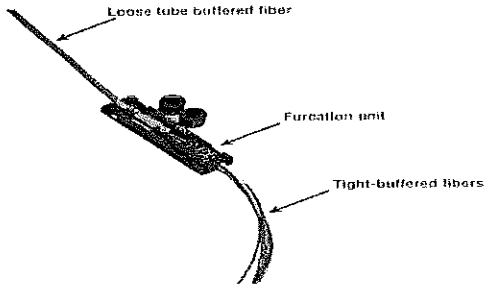
- Some fiber cables, such as simplex and duplex fiber cables, and breakout fiber cables, already have 3mm jacket to accept fiber connectors and can be terminated directly and easily.
- However, for other large fiber counts cables, such as loose tube buffered fiber cables, the fibers are usually only 250um bare fibers. These fibers are bare with little support, and can be broken or damaged easily.

Fiber fan out kit or breakout kit include fiber buffer tubes that can be slipped onto the individual fibers to provide them with protection and support. This is also makes the fiber prepared for connectors and handling.

- The fan out kit or breakout kit is designed to adapt groups of coated fibers for connectors by separating them and adding a tight buffer to each one. The buffer protects the fiber and gives it a thickness of 900um so that a standard connector can be attached.

Whenever possible, fiber splice tray and an enclosure should be used for loose tube termination, especially for heavy outdoor cables.

FIBER FAN OUT KIT

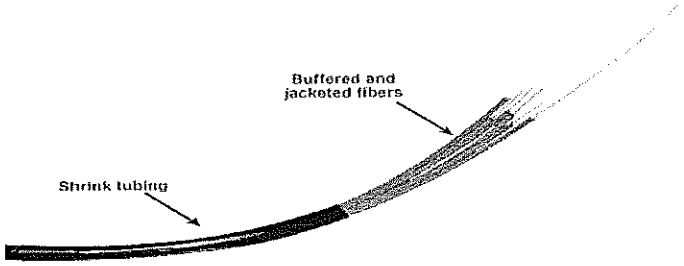


Fiber fan out kit, as shown above, converts loose tube buffered fibers into tight buffered fibers ready for connectors. A typical fan out kit has an enclosure called a furcation unit. The furcation unit attaches to the jacket of the loose tube cable while the unbuffered fibers pass through the unit and out the other end.

Hollow 900um furcation tubes (tight buffer tubes) are applied to the fibers and passed into the furcation unit. The furcation unit is then closed and locks the tight buffers in place on the fibers.

After the fibers are furcated with 900um tight buffer tubes, fiber connectors are attached for use in a patch panel or other protected enclosure.

FIBER OPTIC BREAKOUT KIT

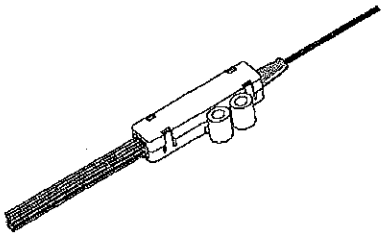


The function of fiber breakout kit is similar to the fan-out kit in that it spreads the fibers from the loose tube buffer through a furcation kit and provides 900um tight buffers to be applied to the fibers.

But in addition to that, breakout kit also includes 3mm diameter jacket with an aramid yarn strength members that slip over the 900um tight buffer and is also locked in the furcation unit. Look at the picture above and you will see what I mean.

For fiber breakout kit, heat-shrink tubing is then applied to provide strain relief and limit fiber bending.

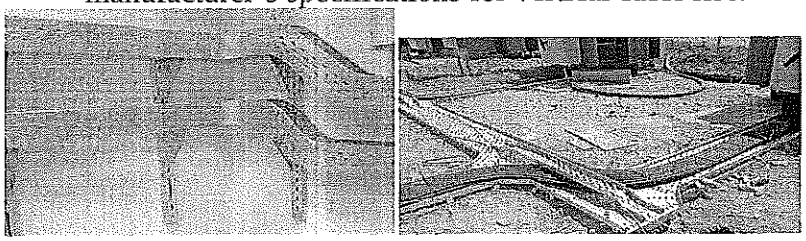
Fiber fan-out kit and breakout kit are also available for ribbon fiber cables as seen below.

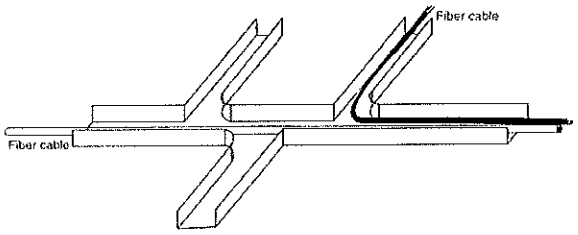


Different fiber counts of fiber breakout kits and fan out kits are available to match the number of fibers in the loose tube cable or ribbon fiber cable. There are also different length 900um buffer tubes and jackets such as 25" and 36" to match the length of fibers that need to spread out from the cable.

Q3. Tray and duct-:

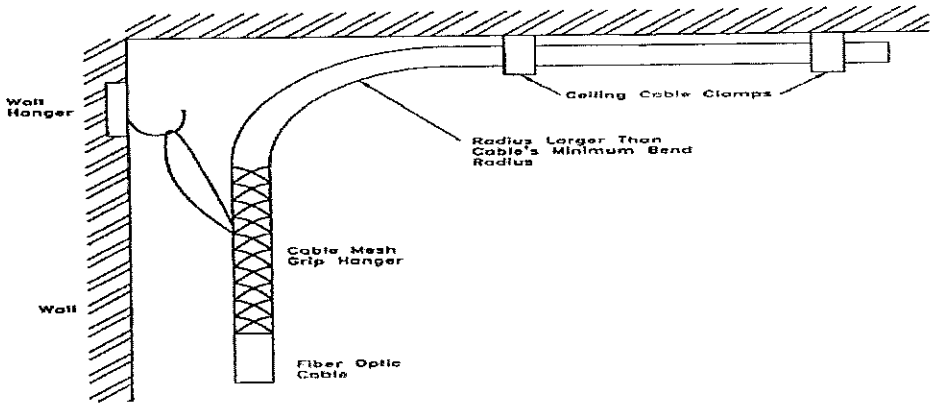
- Tray and duct installation is used inside structures and is similar to installation methods used for electrical wiring. Because many optical fiber cables are nonconductive, some of the requirements and restrictions for copper cables do not apply to fiber.
- When the optical fiber cable rests in trays or horizontal ductwork, the weight of the cable is usually not a factor as long as the runs remain on the same vertical level. If optical fiber cabling is run vertically, however, the cable will have to support itself or be secured using either cable clamps or hangers. Be sure to follow the cable manufacturer's specifications for vertical cable rise.





- The main concern for planning indoor fiber cable routes is to avoid any cutting edges and sharp bends. This includes corners and exit slots of trays.
- When fiber cables are placed in the same tray or duct as large and heavy electrical cable, you must take care to avoid placing excessive weight on the fiber cables.
- The critical consideration when planning cable duct and trays is the **bending radius**. All bends must have smooth curves. When a fiber cable is pulled into a conduit or cable tray, the conduit's bending radius must be larger than the cable's minimum bending radius for loaded conditions.
- Cables in ducts and trays are not subjected to tensile forces. But for vertical runs, this must be carefully designed to minimize the tensile force applied to the vertical run fiber cables. Long vertical runs must be clamped at intermediate points to prevent excessive tensile loading on the fiber cable. The clamping force should be applied over as long a length of the fiber optic cable as practical. If frequent clamping is not possible, cable hangers can be used at the top of the vertical rises and at intermediate

locations along the vertical rises. A popular choice for this situation is the mesh grip or split mesh grip hanger as shown below.



Direct Burial

- To run an outdoor fiber-optic cable out of sight, we can install it by *direct burial*. As the name implies, this method can be as simple as placing a suitable cable directly in the ground.
- Direct burial methods also include placing a cable within a protective pipe or conduit and burying it.
- Direct burial has some advantages.
    - Cables that are buried underground are not visible and do not obstruct the scenery like cables that span telephone poles or buildings.
    - Burying a cable keeps it out of the wind, rain, snow, and ice.
    - The wind from a tornado or hurricane will not damage a buried cable.
    - Unlike aerial cables, a buried cable will not break from the excessive weight of ice from an ice storm.

Direct burial of fiber-optic cables also has some disadvantages.

Fiber-optic cables buried underground are difficult to locate since they do not emit any electromagnetic energy the way a copper cable such as a power line does. Animals that burrow can damage cables buried underground. A direct burial cable typically features an armor layer that protects it from burrowing animals and damage that may be caused when rock is used to cover the cable as is placed in the ground.

Optical fibre cables can be manufactured in such a way as to be ideal for long haul buried applications.

- Loose tube designs make the cables particularly able to withstand certain stresses, while the gel filling prevents water migration. Specially selected jacket materials are abrasion and UV resistant.
- Outside plant cables have high tensile strengths to withstand environmental abuse and pressures of direct burial installations.
- Cables directly buried in the ground should be placed deeply enough to provide adequate protection for the cable.
- One of the major hazards a buried cable faces is the possibility of being dug up. It is usually desirable to place a marker tape over the cable but below the soil to warn future workers in the area that an optical fibre cable lies below (figure 11).

- Armoured cables (cables with corrugated steel or FRP (Fibre Reinforced Plastic)) are rodents resistant.

To place a direct burial cable in the ground, a backhoe or shovel can be used to dig a trench in which the cable is laid and then covered up. This approach is typically used for short runs. For longer runs that require more efficient methods, a cable-laying plow is available. This device is designed to open a trench, lay the cable, and cover it up again while on the move. It is a more complicated machine, but it is useful when longer distances must be covered. When using direct burial methods, be sure to dig the trench deep enough to be below the frost line. In some areas, this can be as much as 30″ deep. Remember that you must contact the local utilities before you begin digging or trenching operations. The location of existing underground cables must be known before you dig.

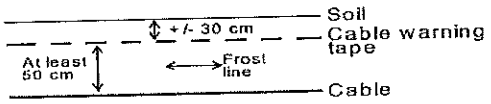
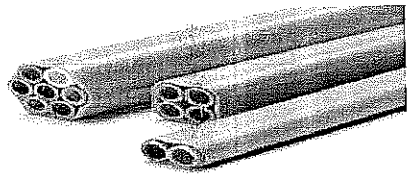


figure 11

Blown fiber



blown fiber and **jetted fiber**—which are used to describe the **placement of a microfiber cable using compressed air**. Those terms infer that the air is pushing or **propelling the microfiber through a microduct**. A more appropriate descriptive term would be **"air lubrication."**

Three steps of installation of blown fiber-

1. **Install the special tubing or conduit.**
2. **Blow the optical fiber through the tubes from location to location.**
3. **Terminate the optical fiber.**

Air is being used as a means to **reduce friction between the microfiber cable jacket and the inside wall of the microduct**.

There are two types of friction that must be overcome by that puck, or in our case the microfiber, to move forward efficiently—**static friction and dynamic friction**. Static friction is the force that exists between the contact surfaces when an object is not in motion. It tells us how much force we need to start that object in motion. Dynamic friction is the force that exists between the contact surfaces when an object is in motion. It tells us how much applied force is needed to keep the object in motion. The heavier the object is, the greater the friction is. So, the more microfiber cable in the microduct, the more friction it has to overcome. Lubricants, such as air, can be used to reduce friction between two surfaces. With a lubricant, the friction resistance is almost independent of the force between the two surfaces and is not so dependent on the materials of the surfaces. Friction is still related to the temperature, which with lubrication affects the viscosity of the lubricant.