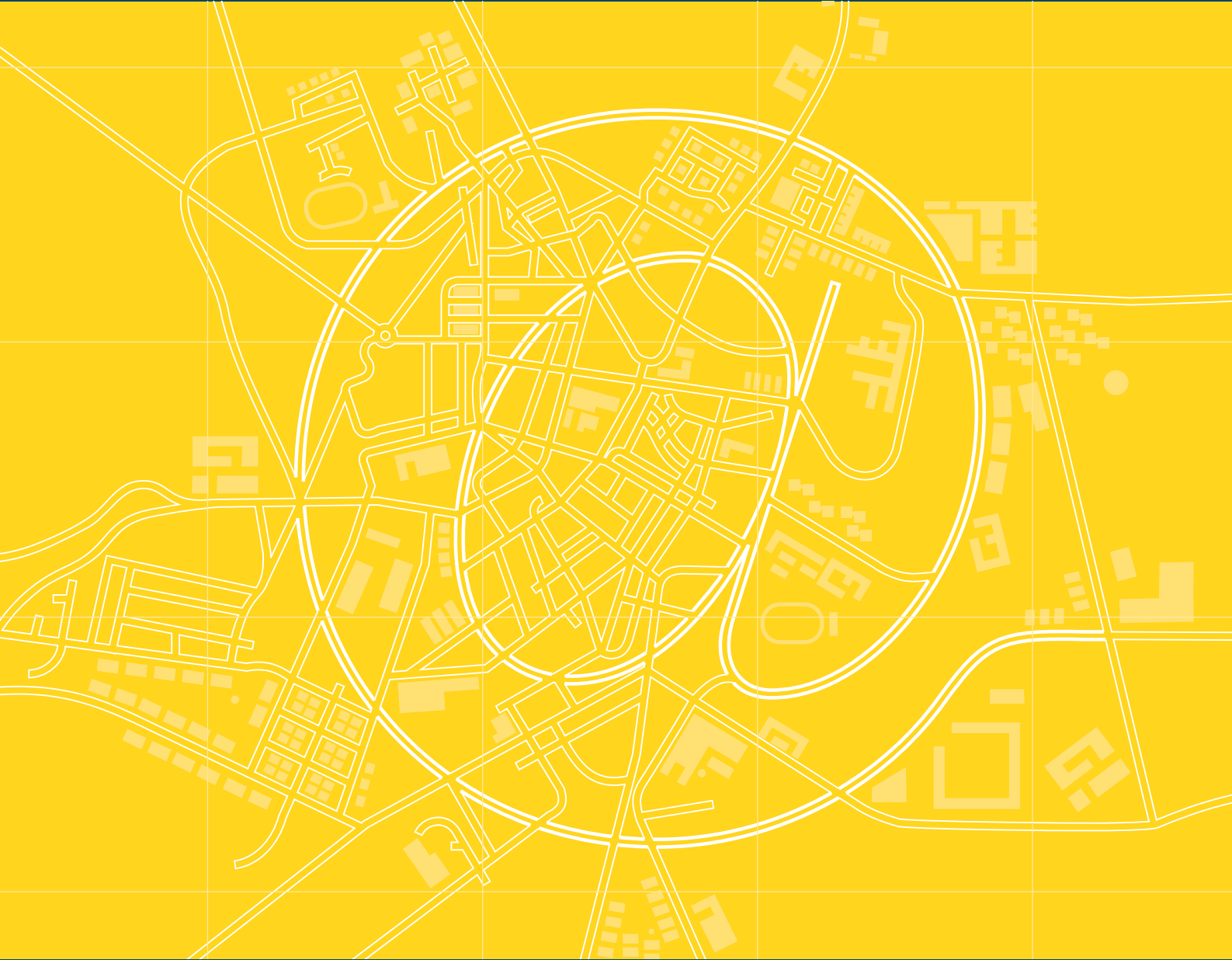


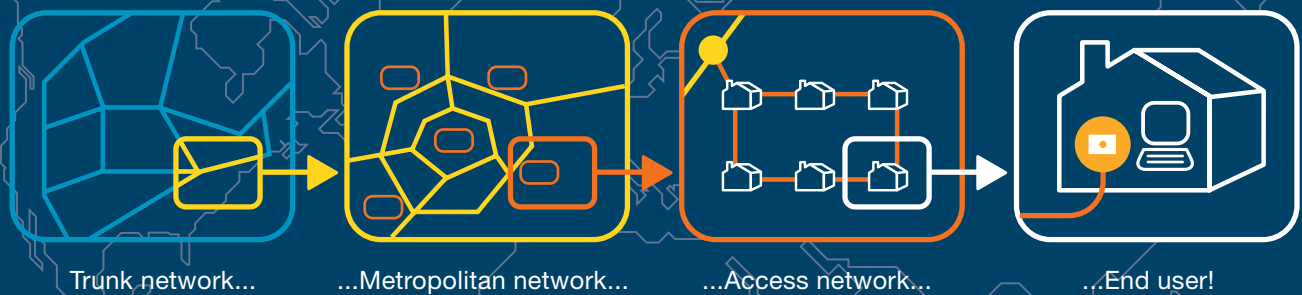
# Access all areas

Micronet™ and Ribbonet®  
fiber optic cabling solutions





# Broadband is smart. Optical fiber is smarter...



## The information Superhighway is there...

Telecommunications, computers, and entertainment are converging on the information superhighway of broadband – bringing people, cities and regions closer together.

Being always on and always connected with high bandwidth offers low-cost access to a wide range of applications, from entertainment to transactions and real-time services such as on-line medical consultations, education and training, community information, etc.

## ...but the exits are missing

But for this to happen requires fiber optic technology all the way to the end user. While today's national trunk networks usually consists of optical fiber, regional and local networks don't, which creates bottlenecks that prevent end users from having access to "real broadband" and service providers and network operators from offering tomorrow's broadband services.

## Network hierarchy

There are roughly three types of network levels:

- *Trunk networks* connect regional networks to each other and national networks to international networks.
- *Metropolitan networks* link urban areas to each other and to the trunk network.
- *Access networks* connect individual end users to the metropolitan networks.

While optical fiber is the ideal choice of cable for all three types, given its supreme bandwidth capacity and durability, Ericsson's Micronet™ and Ribbonet® solutions are fiber optic cabling systems with unique installation concepts developed especially for metropolitan and access networks, where scalability, cost efficiency and easy installations are prime concerns.

# ...Micronet™ and Ribbonet® are even smarter

## Micronet™ and Ribbonet®...

Micronet™ and Ribbonet® are flexible and cost-effective cabling systems for installation of optical fibers in all types of metropolitan and access networks. Built to last, they deliver unlimited bandwidth capacity as well as capability to grow with user needs – and as new users are added.

Ribbonet® is Ericsson's established blown fiber system, especially developed for access networks. When new users arrive, more optical fiber is simply blown into the existing channels, or ducts. Ribbonets air blowing technique uses a patented handheld tool that reduces cable installation time to a minimum, compared to conventional techniques.

## ...the perfect complements

The flexibility offered by air-blown technology is taken one step further – and into metropolitan networks – with Ericsson's new Micronet™ system. One Ribbonet® fiber unit contains from one up to 12 single fibers, whereas a single Micronet™ cable can hold up to 72 single fibers. This supreme capacity potential

makes Micronet™ the preferred choice when installing metropolitan networks. Micronet™ is also a complement to Ribbonet® in access networks, where future scalability is of utmost importance. In this case, Micronet™ is used for the first part of the access network, from the distribution node to intermediary splicing points, where Ribbonet® is used for the final section to the end users.

## Why are Micronet™ and Ribbonet® more flexible than other systems?

The ducts are installed separately and in advance, which means:

- Installation of optical fiber may be incremental, adapted to growth in end user demand.
- Unlike traditional cable pulling, the blown-in fiber is not affected by harsh treatment during installation.
- Minimization of splice points, which reduces installation time.
- Easy network upgrade with more fiber or other types of fiber.
- Simplified network design.



## Micronet™ and Ribbonet®

The result is a future-proof network solution where additional bandwidth may be added at any time depending on investment budgets and end user demand.

### Micronet™ and Ribbonet® meet the demand for:

- *Nearly unlimited bandwidth*, which creates a future-proof network ready for tomorrow's demanding applications.
- *Cost-efficient roll-out and maintenance*, which creates the opportunity for increasing broadband penetration and reaching out to new users.

### Unique Micronet™ features

Micronet™ is the most advanced micro cable solution on the market:

- The micro cables' minimal diameter enables multi-fiber installation even in narrow channels.
- The minimal cable dimensions mean easy transport and handling.

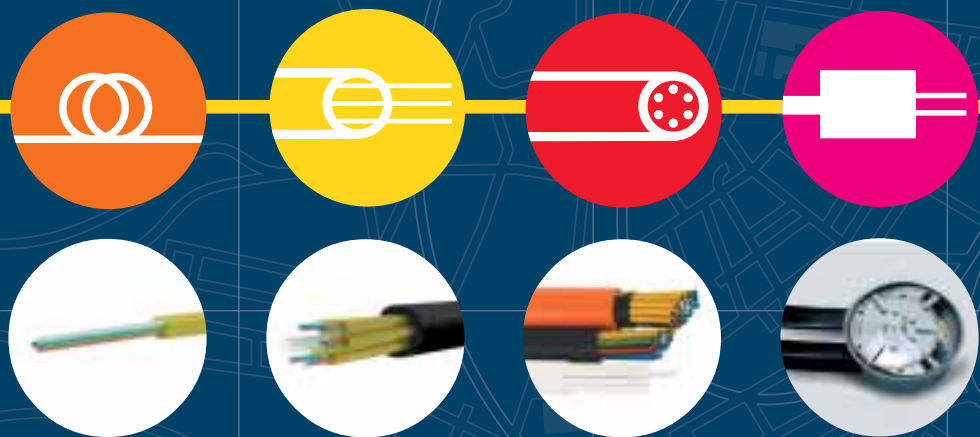
- The Micronet™ cable is designed to maximize installation lengths and to minimize cable jointing.

### Unique Ribbonet® features

Ribbonet® is the most flexible and cost-effective fiber-blowing solution currently available on the market:

- Ericsson's unique fiber-blowing tool is lightweight, hand-held and easy-to-use and offers maximum protection to the highly sensitive glass fiber. And with a capacity to blow up to 100 m of fiber per minute, it is also a whole lot faster than alternative methods.
- Pre-terminated fibers make installation of fiber from the end user faster and easier.
- The micro duct's interior, with its innovative construction design that reduces the friction between the fiber and the duct is designed to speed up the passage of the fiber.

# Components of Micronet™ and Ribbonet®



## Ribbonet® fiber

The fiber used in the Ribbonet® system is an Enhanced Performance Fiber Unit (EPFU) and incorporates one to 12 fibers in pairs into a round structure, encapsulated in a multi-layer acrylate coating and available in single or multimode design. Single-mode fibers have smaller cores and are mainly used for infrared laser-light transmission in the 1,300-1,550 nanometer wavelength bands. Multi-mode fibers have larger cores and are suitable for light transmission in the 850-1,300 nanometer wavelength bands. The choice of fiber depends on the transmission equipment used.

EPFU is available in bulk or on lightweight polystyrene rolls in various lengths (from 30 m to 1,000 m) with pre-terminated fiber that eliminates the fitting of connectors in the field.

## Micronet™ cable

With up to 72 fibers and a diameter of approximately 4 millimeters, the Micronet™ cable has been developed to meet the demand for scalable expansions based on cable blowing technology.

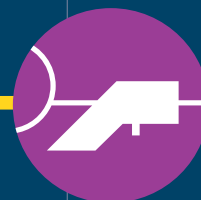
## Micro/multi ducts

The tubes that contain the blown fiber or the micro cable are available in various types – for indoor as well as outdoor use, and for installation in existing channels, direct burial or for aerial installations. The interior of the duct has been specially treated to reduce friction in order to enable blowing over long distances.

Ducts are available in 1, 2, 4, 7, 12, 19 and 24-way tubes.

## Joint closures

Ericsson's micro duct or cable joints are flexible and easy to use. The joint is of "cold joint" type and does not require electricity or gas for the sealing process.



### Fiber distribution fields

The high-capacity fiber distribution frames are designed for optimal termination of blown fiber or fiber optic cable.

### Cabinets

Available for indoor and outdoor use, the splicing cabinets are designed for blown fiber installations and changeover from fibers emerging from micro ducts to all types of fiber optic cables, including the Micronet™ cables.

### Fiber wall outlets

Fiber wall outlets protect the duct and the fiber and are available in several designs for different environments.

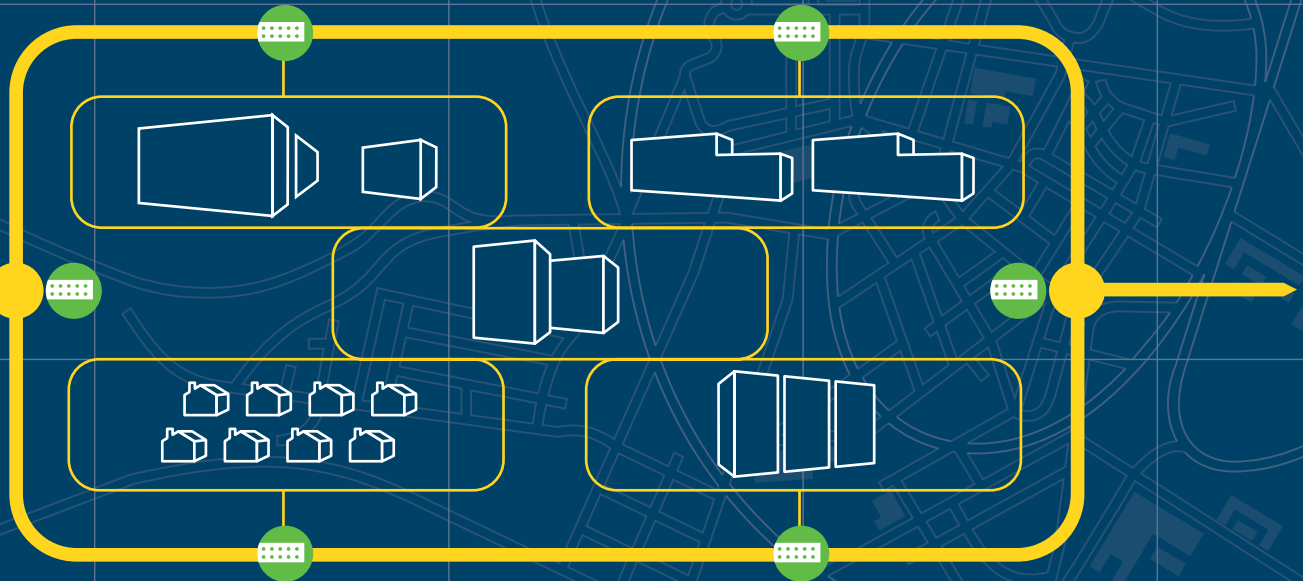
### Tools and accessories

Ericsson offers a complete range of accessories to join and terminate micro ducts, from duct joints and plugs to duct cutters and connectors, making jointing and branch-off easy and effortless.

### Fiber blowing tool

A patented lightweight tool fed with compressed air and designed for optimal performance when installing the EPFU fiber unit in Ribbonet® applications. Micronet™ cable installations are carried out with conventional cable blowing equipment.

# Access – Metropolitan networks



Micronet™ ● Ribbonet® ●

Components – Metropolitan networks

## Metropolitan networks

The fiber optic infrastructure that connects a major city to cities within a municipality is almost always built in a redundant ring or mesh structure with a number of nodes connecting fibers to fiber distribution frames for easy access. Networks in densely populated cities can contain fiber rings with hundreds of fibers, while a network connecting rural areas only contain few fibers. Despite the network's design it is often hard to anticipate future growth and bandwidth need.

Using traditional cabling technologies it is possible to expand network capacity to a certain extent, whereas larger expansions can mean that new cable ducts must be installed, which is very expensive.

Micronet™ is an ideal system for metropolitan networks. The micro cables' minimal dimensions mean that it can be installed in very small micro ducts and a large number of micro ducts can be placed in a single, normal cable duct. The Micronet™ cables can then be installed (i.e. blown) when capacity and end user need so requires, giving large expansion possibilities.

Operational security is an important factor in metropolitan networks. Despite that many preventive measures are taken to enable secure and stable networks, many interruptions are caused by cables being damaged when civil work operations go wrong. In these cases it is important that the network is quickly restored. A Micronet™ based network can easily be re-established by blowing in new cables and outdoor jointing can in many cases be avoided. Using Ericsson's Micronet™ system in metropolitan networks gives a number of advantages:

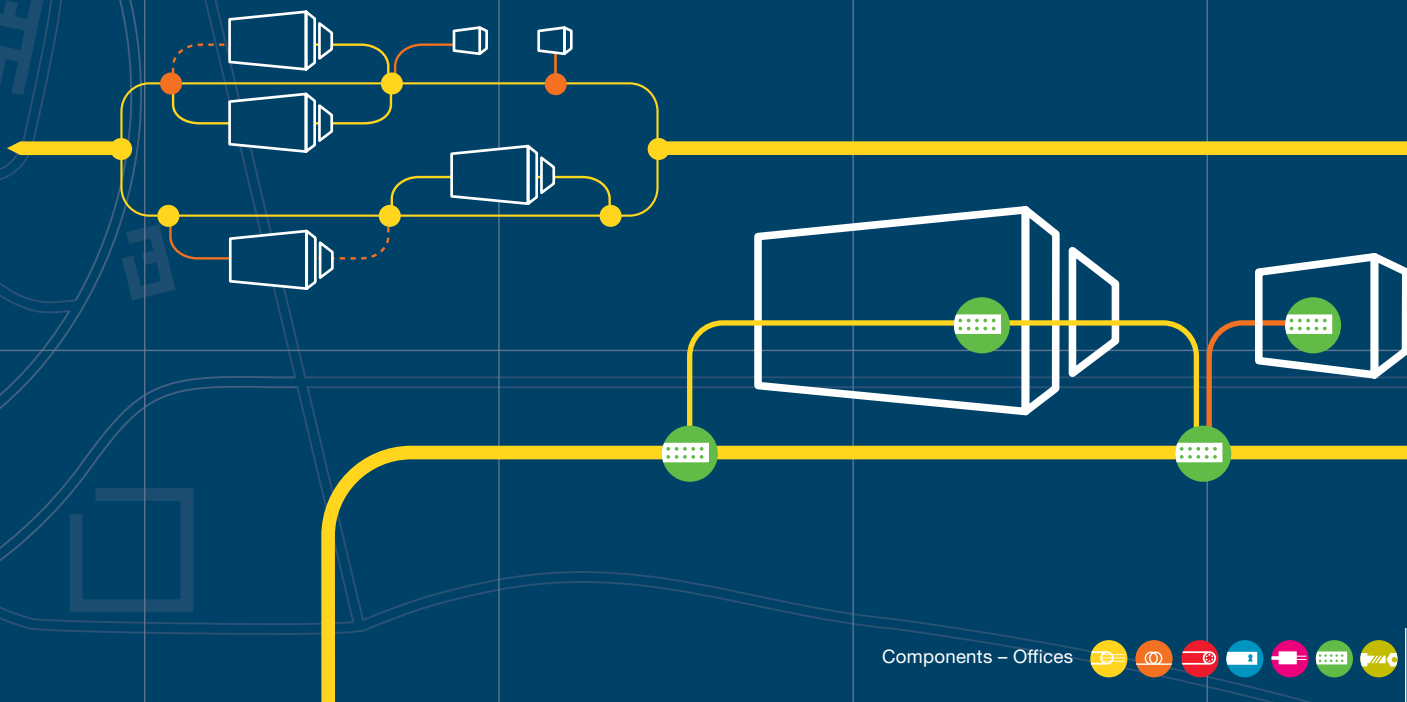
### Flexibility

- Fiber count can be incrementally increased. Expansion scalability is vast – major fiber increase is possible within existing channels.
- Repair is swift and done with minimal interruptions.

### Low initial investment

- Micronet™ minimizes initial investment cost because excess fiber capacity is not needed to guarantee future demands.

# Access – Offices



Components – Offices



## Business Access – Offices and Companies

The distribution network in a business area should be designed to fulfill basic requirements such as scalability and redundancy. An access node is normally located on the premises or within the center of a business area. Access nodes are connected to neighboring nodes or to a metropolitan network with either Micronet™ cables or with Ribbonet® blown fiber installation.

Micronet™ is the most favorable option when connecting access nodes for large business premises and when the number of fibers is assumed to be high.

A Ribbonet® installation is the preferred option when connecting several small and medium sized companies, or in business areas with low initial fiber penetration.

Each access node consists of optical distribution frames with optical connectors, normally connected to a splicing cabinet. The cabinet terminates the ducts for the air-blown installation of either the Micronet™ cable or Ribbonet® fiber units. To enable physical redundancy, the building should be connected with ducts from at least two different directions.

Ericsson's Micronet™ and Ribbonet® systems are the most flexible and cost effective technologies on the market for construction of any business access network. Both solutions offer:

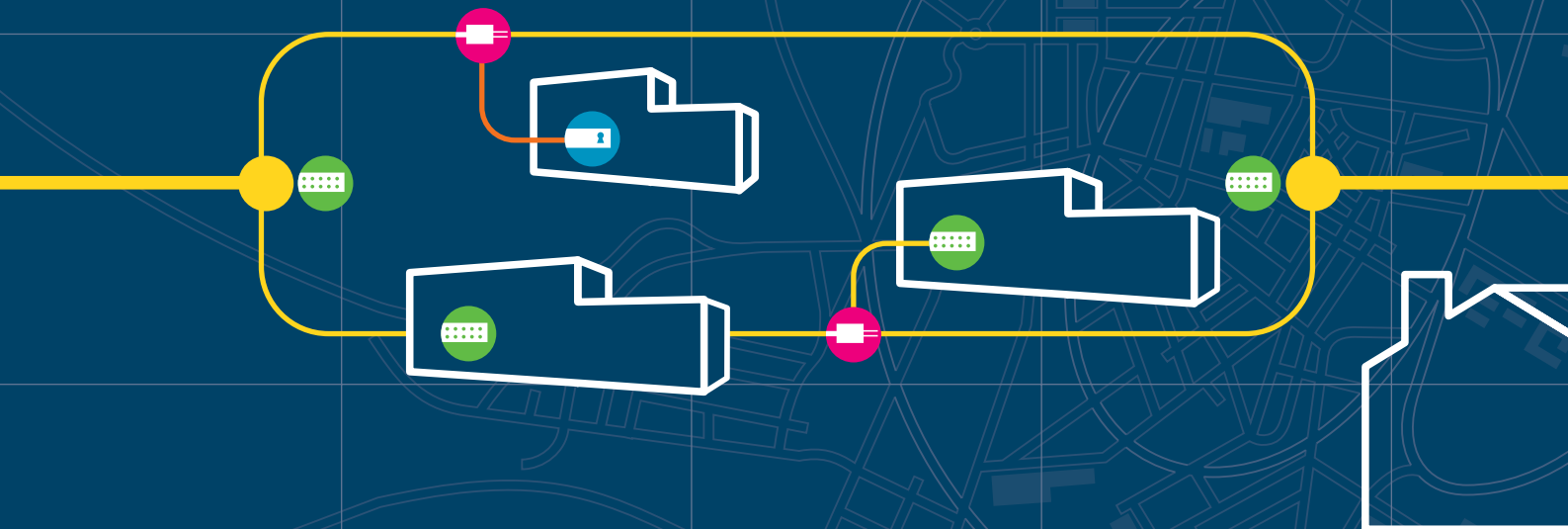
### Flexibility

- Bandwidth may be incrementally added as business grows and new services are introduced.

### Low initial investment cost

- The systems minimize the initial cost for installation of optical fibers. The Micronet™ and the Ribbonet® options give the flexibility of installing fiber on demand, which minimizes initial installation costs.

# Access – Campus



Components – Campus

## Campus Access – Companies, Schools and Hospitals

A campus area is a well defined geographical region consisting of several buildings under the same authority. A campus network is constructed in a redundant ring or mesh structure similar to a metropolitan network, although smaller in size. Access nodes are typically placed on the premises and are connected to neighboring nodes via optical fibers. Given the high fiber count in a campus network, Ericsson's Micronet™ system is an ideal choice to use when designing and installing campus networks.

Surrounding buildings should in certain cases be connected to the area's campus network. Ribbonet® blown fiber technology is the perfect solution to use to connect a number of smaller buildings and when initial fiber penetration is low.

In a campus network, each access node typically should contain a fiber distribution frame, usually with fiber optic connections to a joint cabinet in which micro ducts for Micronet™ or Ribbonet® blown fiber technology is terminated. In order to obtain physical redundancy, each building should be equipped with micro ducts from at least two ways.

Micronet™ is the most flexible and cost effective campus network system:

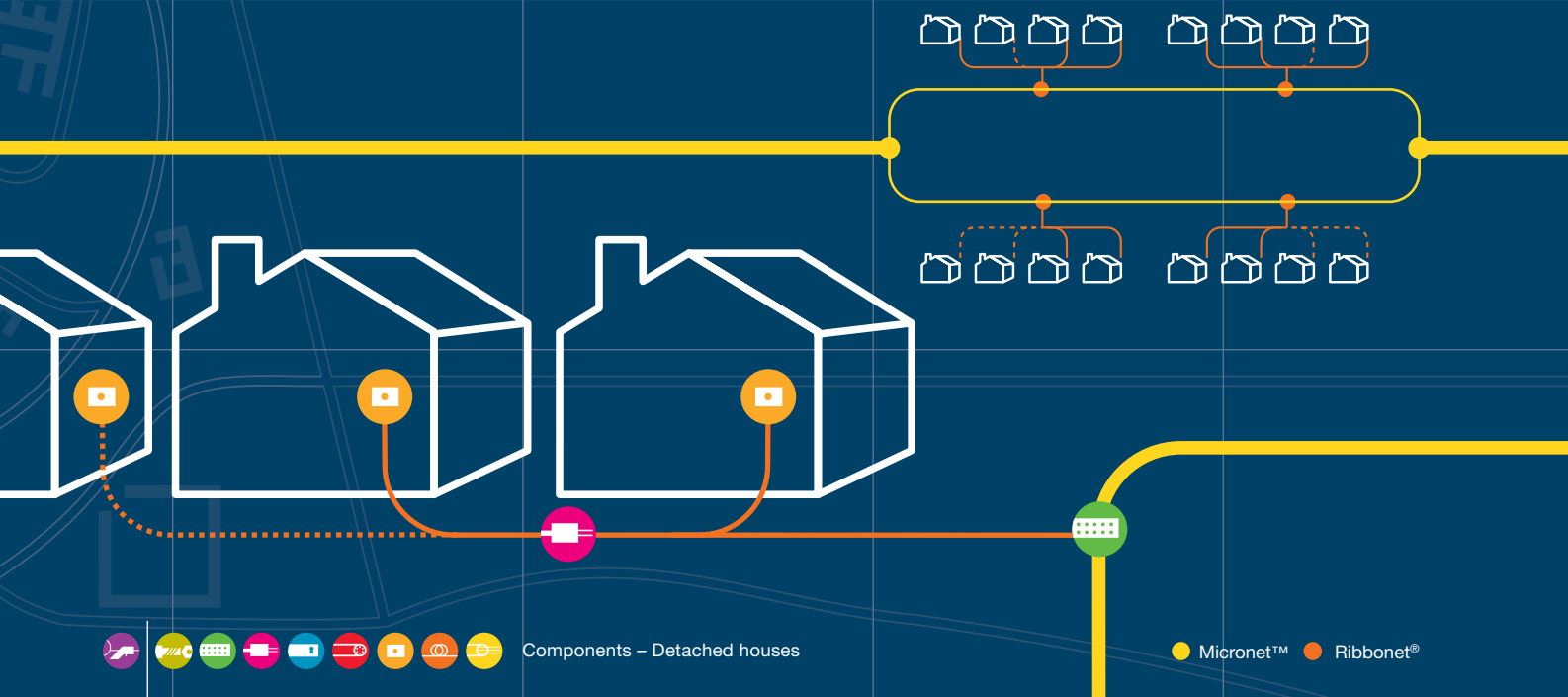
### Flexibility

- Capacity can be incrementally increased as the campus area grows and new services are introduced. Fiber capacity can also easily be dramatically increased.

### Low initial investment cost

- The systems minimize the initial cost for installation of optical fibers. The Micronet™ and the Ribbonet® options give the flexibility of installing fiber on demand, which minimizes initial installation costs.

# Access – Detached houses



## Residential – Detached houses

Fiber optic broadband connection of detached houses has never been so easy. With Ericsson's Micronet™ and Ribbonet® systems installation can be done at an unbeatably low cost.

An access node connecting the detached houses is placed in a suitable location near the premises and a point-to-point connection is established between each house and the access node. Even though the installation of the entire fiber optic network is often not made at the same time in these types of areas, the whole area should be prepared with micro ducts in order to enable future fiber penetration and bandwidth increase.

Connection of the areas access nodes and links to a metropolitan network is preferably done using Ericsson's Micronet™ system. This makes for fast and easy network upgrades when more fiber is needed to connect new end users. Since Micronet™ and Ribbonet® can be co-located with existing power or water infrastructure, installation cost is further reduced.

Fiber optic connection of detached houses using Ericsson's Micronet™ and Ribbonet® systems gives a number of advantages:

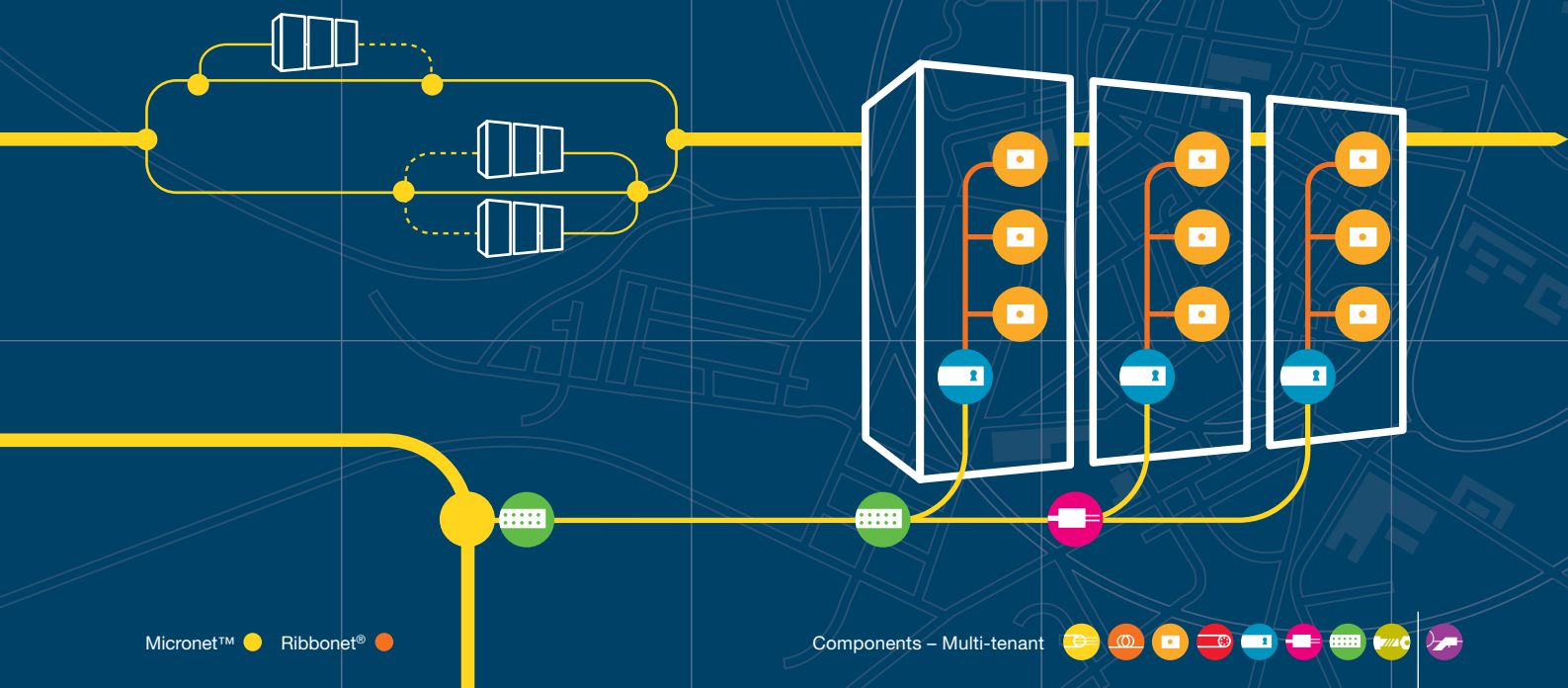
### Low initial investment cost

- The solution means lower initial cost for optical fiber installation since fiber is only installed to paying end users.
- New end users are connected fast, easy and at low cost.

### Flexibility

- Combining Micronet™ and Ribbonet® makes it easy to connect new end users. New fiber is simply installed in existing micro ducts using blown fiber technology.

# Access – Multi-tenant



## Residential – Multi-tenant

Fiber optic network expansion in multi-tenant housing is a prime example of the cost efficiency offered by the combined use of Ericsson's Micronet™ and Ribbonet® technologies.

Ideally, the local access node should be centrally located within a multi-tenant housing block. Each building is connected to the fiber-optic network through these nodes. Since the amount of fiber required between the access node and the building is often substantial, using Micronet™ is particularly beneficial for this application. By adding a spare micro duct at the time of initial installation, the amount of fiber may easily be expanded later without any interruptions to existing traffic.

When installing fiber in multi-storey buildings, the number of splice points in each property should be minimized in order to cut installation cost. Fiber splicing from each apartment and into the Micronet™ cables are normally done in a splicing cabinet in the basement or on the ground floor of the building.

Originating from inside the splicing cabinet, a flame-retardant micro duct is installed to each apartment. From each apartment, a pre-connected Ribbonet® fiber unit is then blown into the micro duct. The use of pre-connected Ribbonet® fiber eliminates time consuming mounting of connectors and fiber splicing inside apartments and allows for high-speed installation.

The combined system with Micronet™ and Ribbonet® technology offers these advantages:

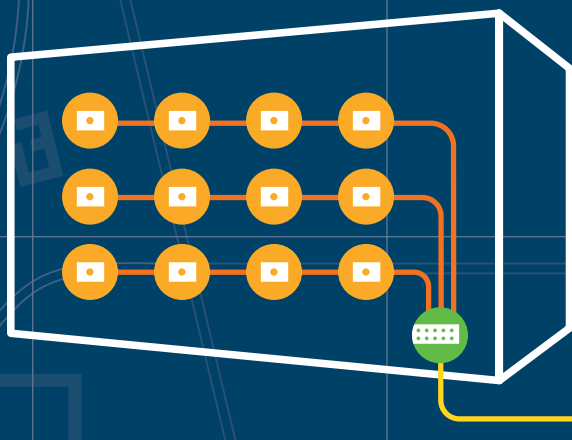
### Low installation cost

- Using pre-connected fiber minimizes time consuming fiber splicing and mounting of connectors during installation.
- Apartments may be connected on demand.

### Flexibility

- Network expansion is done easily and quickly by blowing new fiber into existing micro ducts.
- Repair requirements and other network changes are easy to undertake.

# Access – LAN



Components – LAN



## Local Area Networks

The innovative installation technology in the Ribbonet® cabling system have made all-fiber Local Area Networks (LAN) much less costly than they once were. When installing LANs, there is little or no difference in the cost between installing UTP copper cable and Ribbonet® fiber. In fact, Ribbonet® offers considerable initial savings. And the savings increase throughout the lifespan of the network, since the network structure means lower maintenance costs and permits an easy upgrade of network capacity.

In a Ribbonet® based LAN, cable splices and connection fields on each floor level is optional and is usually not required. Fibers are installed all the way from the fiber optic wall outlets down to a centralized Building Distributor (BD). This network structure is called a collapsed backbone. In the BD, the fibers are normally terminated in fiber optic termination panels.

When installing fiber connections in buildings with more than 100 wall outlets per floor, or when limited space is available for cabling in vertical risers, the collapsed backbone with floor

distributors (FD) should be considered. The connection between the BD and FD is carried out with Micronet™ cables or blown fiber in micro ducts. Consequently, the FD(s) are passive splicing cabinets, where blown fiber from each wall outlet is spliced towards a Micronet™ cable or blown fiber.

The benefits of a Ribbonet® fiber optic LAN are:

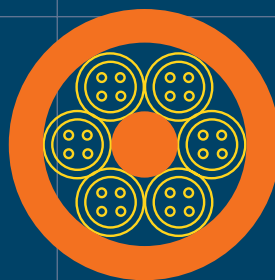
### Flexibility

- Fibers can be added or replaced on demand in existing micro ducts.
- Less office space needed for floor distributors.
- No need for floor distribution patch panels and cables.
- Lower maintenance cost – no active equipment on each floor level.

### Higher capacity

- All connections pass through the network without concentration points.
- Fully symmetrical network.

# Facts



Ribbonet® fiber | 1 mm diameter | 1–12 fibers

Micronet™ cable | 4 mm diameter | 4–72 fibers

Conventional cable | 15 mm diameter | 4–96 fibers

## Optical fiber – crystal clear

Optical fiber is made from optically pure glass as thin as a human hair and the only broadband technology that offers virtually unlimited bandwidth potential. One single fiber from Ericsson has the capacity to simultaneously carry two million telephone conversations or more than 2,000 digital TV channels. The digital information is sent in the form of laser-generated light, which enables transfer speeds of at least 100 Mbit/s (theoretically unlimited) – more than enough for tomorrow's demanding applications.

## How it works

Sound, text or pictures are first converted to digital electric pulses, which are then converted to light pulses by a laser diode. These pulses are fed into and guided through the fiber to a receiving diode at the other end, where they are converted back to sound, text or pictures. The purity of the fiber enables light to be guided through it over 300 km without amplification.

Moreover, since glass is an organically adapted material, optical fiber does not contribute to waste or emissions. Other advantages of optical fiber technology are:

- Inexpensive (glass is not a scarce commodity).
- No interference (unlike electrical signals, light signals from one fiber do not interfere with those of other fibers in the same cable).
- Energy efficient (optical fiber networks are more energy efficient, because signals in optical fibers degrade less).
- Digital (optical fibers are ideally suited for carrying digital information, which is especially useful in computer networks and digital broadcasting).
- Non-flammable (no electricity is passed through optical fibers, which removes the fire hazard).
- Thin and lightweight (an optical cable weighs less and takes up less space in the ground).



Ericsson is shaping the future of Mobile and Broadband Internet communications through its continuous technology leadership. Providing innovative solutions in more than 140 countries, Ericsson is helping to create the most powerful communication companies in the world.