

## Hudiksvallsbostäder: “We go fiber all the way”

## Hudiksvallsbostäder AB

Hudiksvall is a municipality situated in North of Sweden, two and a half hours by train from Stockholm where 38 000 inhabitants live. The municipal real estate company is called Hudiksvallsbostäder AB. This company owns around 4500 apartments. In 1996, the municipality started to build an optical fiber metro network. Two years later, as Internet usage had grown explosively in Sweden, Hudiksvallsbostäder AB began to investigate how the company could provide fixed broadband access to its tenants. The company teamed up with Ericsson and in 1999, the first test site with fiber to 770 apartments was completed. Due to the success of the installation and the positive response of the tenants, it was decided that the fiber to the home installation would be extended. In June 2002, 2040 apartments have been connected to the fiber network. Subscribers get access to 100 MB/s symmetrical connectivity for 249 SEK a month. The start up fee is 495 SEK including VAT.

### Why fiber to the home?

Nils-Erik Blomdahl, Head of Administration of Hudviksvallsbostäder explained the company's position. *“It was important to keep the architecture as clean as possible, so as to enable an operator independent network. This also helps the application developers that want to offer their services to our customers.”* The company evaluated several access technologies, but despite significant investments, fiber was rendered the most future proof technology. Nils-Erik Blomdahl adds: *“But there were also considerations, like environmental factors. We did not want to introduce another source of electrical radiation that would come if we had deployed copper in the buildings.”*



**Figure 1: Nils-Erik Blomdahl, Head of Administration,  
Hudiksvallsbostäder AB**

## Overall architecture

The broadband fiber network in Hudiksvall is a three layered architecture, consisting of a City PoP, three regional nodes and several local nodes. The City PoP is the interconnection point for regional and national carriers that serve as ISPs (Internet Service Providers). The regional nodes collect subscriber traffic from the local nodes and forwards IP traffic via the city PoP. The local nodes switches are close to the customers and switches subscriber traffic. The Ethernet switching equipment consists of Extreme switches; Black Diamond and Summit. The network is operator independent. Within the city of Hudiksvall, 41 km of optical cable has been laid by June 2002.

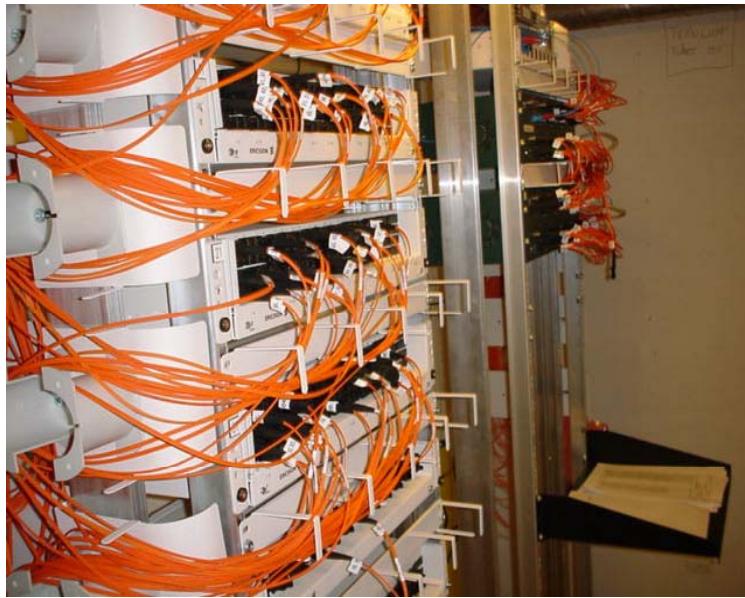
- City PoP
- Regional node
- Local node



Figure 2: Fiber network architecture in Hudiksvall

### Fiber deployment method- Multi tenant buildings

Hudiksvallsbostäder AB has connected 2040 apartment to the fiber network. The equipment is placed in a separate, locked room in a centrally located room where the ducts for electricity are terminated. In this room, the Optical Distribution Frame (ODF) is placed together with the Ethernet switch. The company has outsourced the installation and when the subscriber requests the service, the fiber cable is patched to a free switch port. Multi Mode fiber is used from the local node to the individual apartments.



**Figure 3: Local Node with Optical Distribution Frame (ODF) & switching equipment**

The Ericsson Ribbonet® cabling system was used for the installation of fiber. The system is based blowing fiber into pre-installed microducts. The microduct containing the fiber from the basement of the building is installed alongside the electrical cables to each floor. Each multiduct has 4-19 microducts and lead to the electricity cabinet located in each floor of the building.



**Figure 4: Microduct bundles with splices in a cabinet for electricity metering equipment**

At this point the ducts are distributed to provide connectivity to individual apartments. Each single duct contains two fibers, one receiver and one transceiver for dedicated access. These fibers are pre-connected with an optical connector (MT RJ) and blown from the apartment.



Figure 5: Pass way for micro ducts in electricity riser

## Fiber Splicing

Hudiksvallsbostäder AB uses outdoor cabinets to connect fiber coming from the apartments to the access network. The cabinet is in the shape of an electricity cabinet, so as not to attract unnecessary attention. One cabinet can connect 120 apartments.



Figure 6: Outdoor splice cabinet to the right

The Ribbonet® fiber is spliced to the main fiber (Single Mode) network. A fiber splicing machine for multiple fibers, a so-called, “Ribbon splicer,” is used. Since there is no active equipment and fibers are fusion spliced (a fiber welding technique), the installation is resistant to temperature changes.



Figure 7: Interior arrangement with splice cabinet inside street cabinet

The fiber pairs come in micro ducts from individual apartments that are connected via the white splice cassettes to the main fiber network. These are optical cables that connect the apartments to the local node.

## Home installation

Once a subscriber has signed up for broadband Internet, one field technician will visit the apartment to install the duct where the electricity outlet is, install the opto-electrical converter, blow the fiber from the apartment to the splicing point, which is typically an outdoor cabinet and clean the working area. It takes around 15 minutes for the field engineer to do this process.



**Figure 7 Fiber blowing from apartment**

The home connection consists normally of one or several electrical RJ45 jacks. In case of fiber, an opto-electrical conversion unit is installed, where the optical signal is converted to an electrical signal and terminated in the RJ-45 jack.



**Figure 8 Home termination, Opto-electrical converter**

## Ericsson's contribution

Ericsson provided the fiber plant, fiber blowing system (Ribbonet®), switching equipment, opto-electrical converters and consulting services. In addition, Ericsson built and designed the metro network and integrated it to the fiber Ethernet access network. Nils-Erik Blomdahl adds: *"The cooperation between Hudiksvallsbostäder AB and Ericsson has been excellent and a key success factor has been an almost zero time between decision and implementation."*

## Conclusion

Hudiksvallsbostäder AB has deployed a fiber Ethernet network, providing fiber connectivity to 2040 apartments. Hudiksvallsbostäder AB evaluated several different technology options. The company settled for fiber Ethernet to the home because fiber was considered the most future proof technology, providing long term advantages in terms of capacity and cost efficiency. It was also the technology that would have the best potential to attract application developers. The network consists of a three layered architecture consisting of a City PoP, three regional nodes and several local nodes. It is operator independent.

The close relationship between Hudiksvallsbostäder AB and Ericsson has resulted in an industry record fast activation of subscribers. By using the Ribbonet® cabling system and pre-installed micro ducts, Hudiksvallsbostäder AB has been able to keep fiber installation costs down, minimize the amount of fiber splicing points and achieve a stress free fiber installation.

With Hudiksvallsbostäder AB, Ericsson has installed more than 20,000 fiber to the home installations over the world by June 2002. Ericsson is one of the founders – and a board member – of The Ethernet in the First Mile Alliance (EFMA) and a driving force in its work to promote Ethernet access technology and open standards that support multi-vendor interoperability.



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.