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Operation, Administration and Maintenance of Municipal Fiber Networks

Case Study Lienz in Eastern Tyrol

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EXECUTIVE SUMMARY

The region of Lienz in Eastern Tyrol is a pioneer in municipal broadband networks and the activities take place in a state which itself also has a pioneering role in terms of how the public sector understands broadband issues.

Over the last years, the 15 municipalities in the area of Lienz have initiated a project against the background of the following setting:

1. The municipalities in the region have taken the responsibility for deploying the passive network (ducts and fibers) based on a FTTB(H) concept, partly supported by state aid.
2. The municipalities are confronted with a large number of tasks for the deployment and the operation and maintenance of the network. The selection of network providers for the active network and the provision of services has attracted wider interest. 3 active operators ensure competition in the end user market. The key aspects that remain as tasks for the municipality are network operation, maintenance, installation, fault repair, inspection and documentation.

A number of lessons learnt can be listed especially with respect to processes for network deployment, maintenance, inspection etc. Municipalities have to dive into detailed operational details in order to achieve successful project results. Such detailed aspects of the project contain e.g. the fiber concept, the connections to the buildings, a delineation between tasks of operators and municipalities, inspection, documentation and operation and maintenance. A key factor is that projects tend to be small and struggle to achieve economies of scale

1 The task for municipalities in fiber deployment

All over Europe the past decade has demonstrated the requirement for faster and future proof broadband networks. The private sector has indicated that the rollout will not cover the complete country due to the lack of economic viability. Therefore, many people, several regions and a number of businesses are left behind with respect to future proof and reliable broadband supply.

This development has led the public sector to reconsider its role in broadband deployment. The public sector increasingly considers a more active role in deployment and operation of broadband networks. Countries have implemented various approaches, i.a. granting state aid, supplying finance support, establishing infrastructure companies, supporting local communities and municipalities, etc.

This paper looks at the case study from Eastern Tyrol, the region of Lienz, with respect to the deployment, operation, administration and maintenance of municipal fiber networks.

The paper came about by looking at one of the pioneer regions in Tyrol for broadband deployment, the region of Lienz with the city of Lienz with a total of 15 municipalities in that area. Lienz is a pioneering region in Tyrol as much as Tyrol is a pioneering region in Austria with respect to municipal broadband rollout.

Tyrol started the broadband activities of the public sector in 2013 with the publication of the first broadband masterplan and by making available 50 million Euro state aid for the period 2013 through 2018 for the deployment of passive broadband networks by municipalities.¹ In the Tyrolean model, broadband is understood to represent infrastructure based on Fiber-to-the-Home/Fiber-to-the-Building.

The goal of the Tyrolean model is to enable municipal passive fiber networks and to allow for service competition in rural areas by open access on these networks for integrated players that provide network operation and also services to residential and business end-users. Thus, it represents a 2-Layer-Model called "Passive Sharing" whereby it should be stated that also a 3-Layer-Modell ("Separation") is possible, but the overwhelming majority of municipalities have opted for the 2-Layer-Model by now.

¹ This program has been extended by a further 50 million Euros for the period 2019 through 2023.

Key measures that have been implemented within the framework of the broadband masterplan are

- to grant state aid for municipalities directly
- to grant state aid for businesses which require a better broadband connection
- to make available ducts from the regional power supplier TIWAG and
- to look for synergies in the deployment of passive networks.

As of Q1 2017, from the total of 279 municipalities in Tyrol, more than 150 have already started such projects and the number is increasing on a year to year comparison. To interpret these figures correctly it has to be considered that more than 100 municipalities already had a sufficient broadband supply before the start of the Tyrolean broadband masterplan. This increase takes place despite the introduction of a state aid program of the Austrian government that grants state aid either to municipalities or to operators for the provision of duct infrastructure, backhaul connections or access networks.

The Tyrolean model requires municipalities to take over responsibility for rollout of broadband networks. In general, municipalities have to deal with 4 major issues when entering into a project for the deployment of broadband networks:

- Firstly, financing has to be secured. Here, state aid measures come into play. One aspect is of course the EU framework on state aid and the respective conditions which enable or which hinder the public sector to "intervene" into the deployment of broadband networks. Furthermore, in the case of Lienz, the state aid granted by the state of Tyrol (which was already described above) is a cornerstone and also the state aid program by the Austrian government which encompasses three programmes of which one is directed to municipality-led broadband passive networks is key to the deployment of the municipal broadband activities.
- Secondly, the deployment of passive fiber infrastructure itself is the major task. Issues that the municipalities have to deal with either by themselves or in cooperation with partners are aspects like
 - the usage of empty ducts,
 - the usage of the infrastructure made available by TIWAG and TIGAS (the publicly owned utility for electricity and gas),
 - access to buildings,
 - fiber cables,

- the optical distribution frame,
- splicing,
- rights of way,
- network planning,
- physical deployment.

All these aspects have to be integrated into an overall plan which is focused on the local conditions and the realisation on site.

- Thirdly, the municipality has to select an operational model. In Tyrol, two models have been developed as suitable by the state government. The first model is called **passive sharing** where the municipality owns and operates the passive infrastructure and service providers are responsible for network operation of the active elements and supply their own services. In principle, the service by the municipality is to provide "unbundled fiber access lines" to network operators which also implement the collocation in the optical distribution frame of the municipality and compete for customers.

The second model is called **separation** where the municipality does contract only with one operator for the active network and service provision and this operator then has to provide open access to service providers to its active network. This in the end may result in a 3-layer model, whereby in most cases in Tyrol the municipalities have opted for the passive sharing model simply due to the fact that it also eases and accelerates competition on the end-user level by different operators.

Irrespective of which model is chosen, the municipality has to conduct a selection procedure which allows all interested parties to become operators in the municipality based on standard contracts for the usage of the passive municipal fiber network.

- In the fourth step, the municipality has to take care of aspects of operation and maintenance. This task is more pronounced in the model of passive sharing. In the contract between the municipality and the operator a number of tasks are being assigned to each party, and the following tasks usually stay with the municipality with respect to the passive network:
 - realisation of connections,
 - maintenance and repair of the passive network,
 - documentation of the network,

- inspection of network elements,
- administration,
- billing.

In order to fulfil all these tasks, the municipality can either conduct these tasks itself or look for service providers that take over these elements of the value chain. Thereby, it is possible to select a company that provides this service on a wholesale only level to all network operators in the municipality or one of the existing network operators takes over these tasks which requires specific provisions to ensure that such a company which is active on the wholesale and the retail level does not discriminate between different retail service providers.

2 Use case Lienz

In the following chapter we describe in more detail how the region of Lienz conducted a project for the deployment of a passive broadband network.

The city of Lienz is located in the region called East Tyrol which is geographically separated from the rest of the Austrian part of Tyrol. The city of Lienz is the heart of the region and surrounded by a total of 15 local municipalities which are organized in "Planungsverband" ("municipalities planning association") that organized this project jointly. East Tyrol as an exclave to Tyrol is difficult to reach and the infrastructure to the region is hard to implement and deploy which applies not only for telecommunications but also to other basic infrastructure such as for example road and railways.

The region of East Tyrol suffers from insufficient broadband rollout. After the Tyrolean government granted state aid for the deployment of a municipal network, the region went for a 2-step procedure in order to select operators for network operation and service provision by applying the passive sharing model. In July 2015 a total of seven operators declared their interest to use the municipal network in Lienz and the list encompassed A1 Telekom Austria, Brennercom, DefNet, IKB (Innsbrucker Kommunalbetriebe), Tirolnet, UPC, and Ventura Team. Based on an analysis of the documents provided, five of these operators were declared as qualified and they were offered discussions and talks and negotiations to become operators in the region. From all five companies which were declared as qualified offers were received but in the negotiation procedure it became obvious that not all of them could agree to the contractual conditions and terms set out. In the end, three operators signed contracts for becoming a network operator and service provider on the municipal fiber network. These companies were Tirol Net, UPC and some months later, also IKB.

As a next step, the municipality conducted the preparation for a tender for operation and maintenance of the passive network. Based on draft documents provided by the state government of Tyrol, the municipality initiated selection procedures for operation and maintenance of the passive network and thus was able by 2017 to enter into contractual relationships following the continued deployment of the broadband network which at that stage had reached Phase 3 out of a total of 7.

3 Operation, administration and maintenance

3.1 Processes

As already stated in previous chapters, the task of the municipality does not end with the deployment of the network and the selection of operators. Operation, administration and maintenance of the passive network remain a task which needs to be undertaken in order to have a future-proof long-term solution.

This implies that contracts between municipalities and providers have to be struck containing obligations for the municipality for operation, administration and maintenance of the network. Some key issues have been identified:

- The key determinants for design:
 - The delineation between the passive network and the in-house network has to be clarified in order to define the end point of the public network. It is important to clearly define the division of responsibility between the public network, the operator and the owner of the premises.
 - Fiber concept: Decisions have to be made with respect to the number of fiber strands per object and per household. It is also required to define whether p2p or p2mp architecture will be used.
- The tasks within operation, administration and maintenance have to be classified and it proved that a differentiation according to installation and connections, fault repair, inspection and documentation was seen as useful.

In the next step the municipality then has to take a decision whether to produce these services themselves or to purchase them from a qualified professional supplier in the market (make or buy). In case these services are tendered, the selection procedure has to be defined which requires a pre-analysis of the potential volume in order to select the right tender procedure.

With respect to the delineation of the passive broadband network and the access network and to demonstrate the fiber concept, the following two graphs provide the relevant information chosen for the region of East Tyrol.

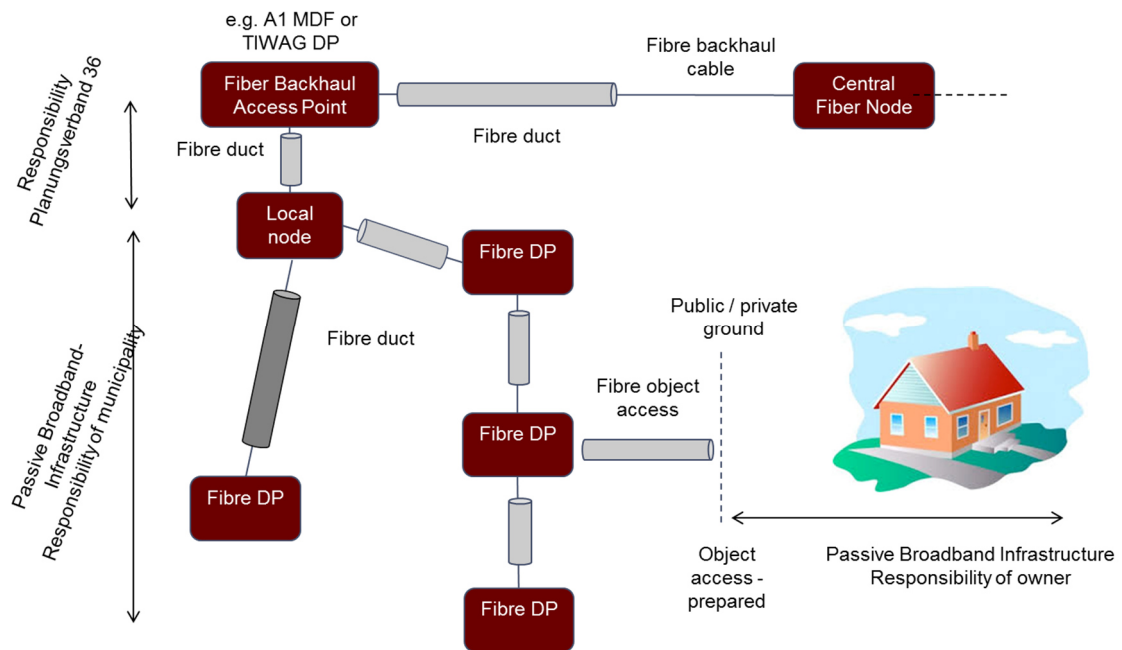


Figure 1: Delineation of the passive broadband access network

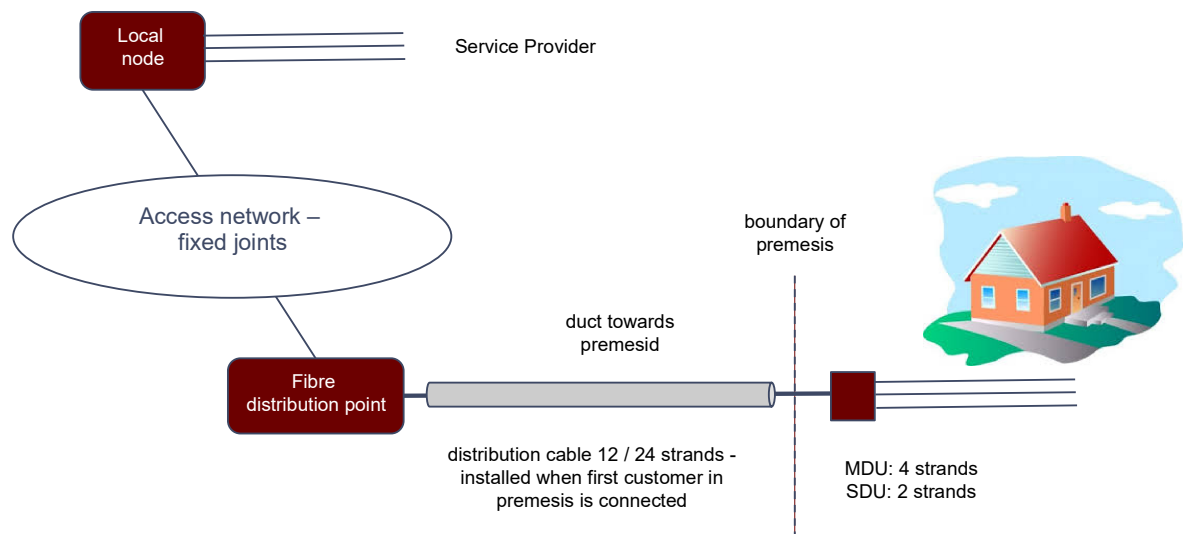


Figure 2: Fiber concept

For each of the processes, a flow chart shows how these are organized so that the municipality can fulfil its contractual obligations.

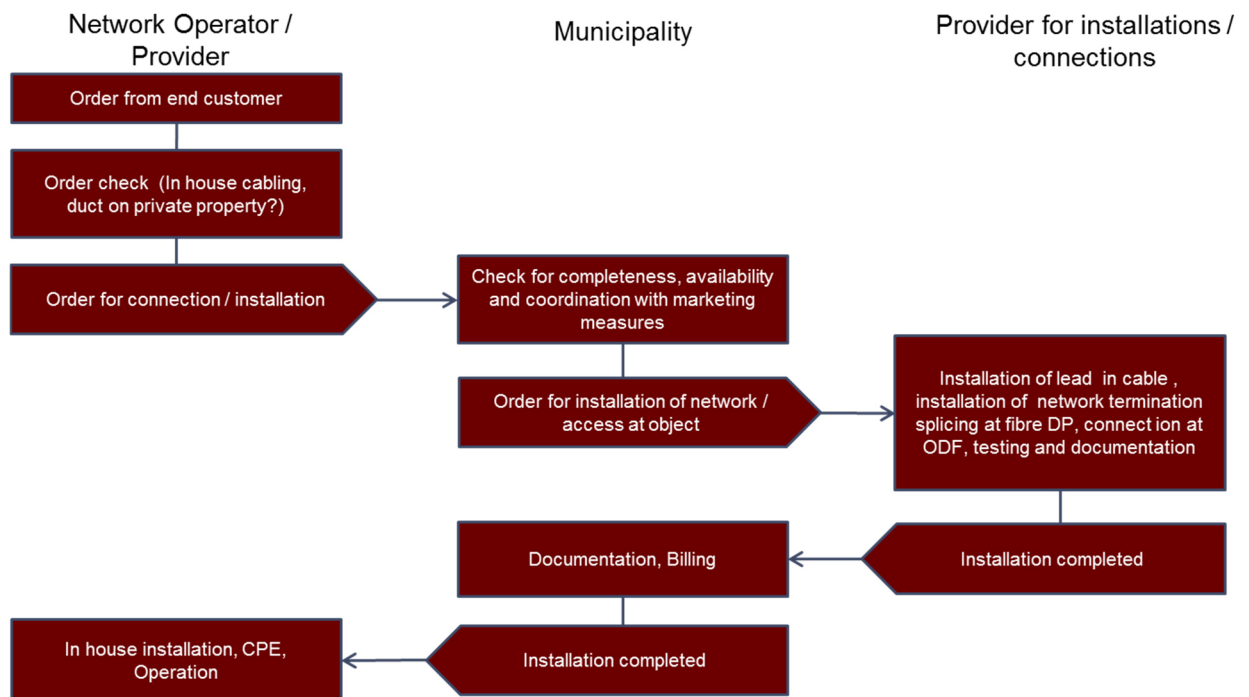


Figure 3: Installation and connection processes

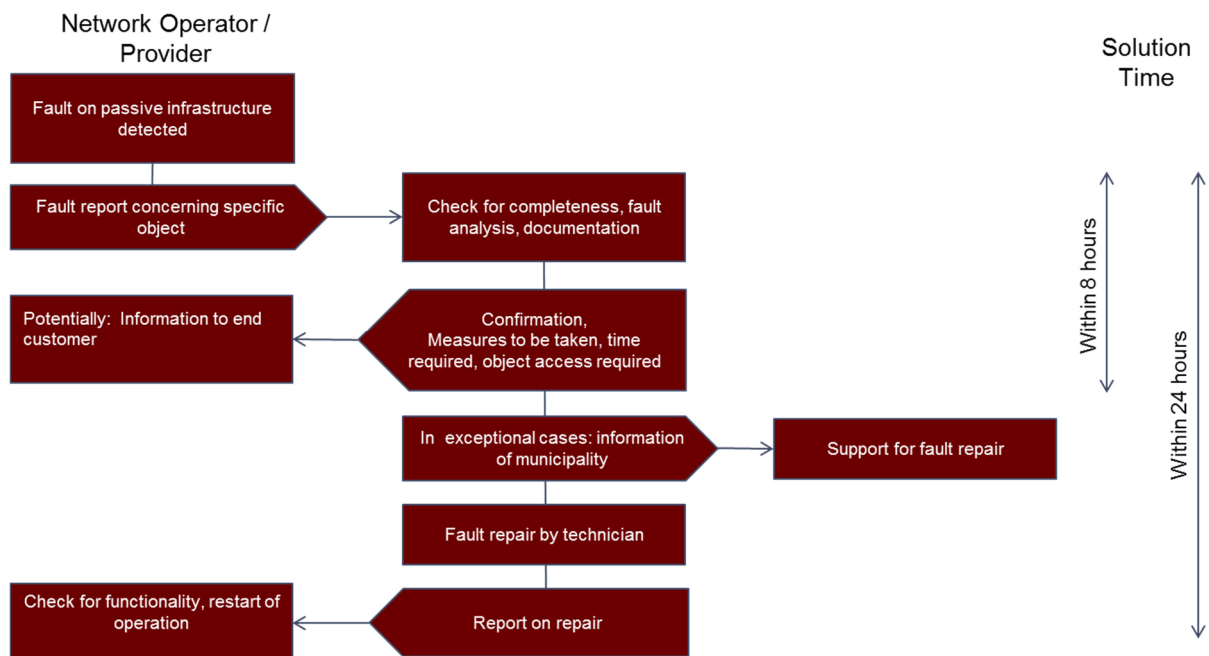


Figure 4: Fault repair processes

The tasks of installations and connections and fault repair are those with the highest economic relevance and need to be thoroughly defined and structured and in order to guarantee a continued service and the correct processes between municipality network operators. With respect to the task of network inspection this is more a periodic check of the

passive broadband infrastructure where the network elements such as distribution points and local nodes are analysed with respect to damage, soiling/dirt, security and the protection of power supply.

Documentation encompasses the management system for documentation which can either be purchased from professional providers off the shelf or can be specifically designed. The documentation system has to cover network elements, the location of lines, connections, business processes, and customers.

The documentation requires a clear marking, the availability of a central data base, access to data, and the web browser.

There are also further tasks which fall under the responsibility of the municipality and which encompass:

- Contract management
- Accounting
- Billing
- Coordination and cooperation
- Self provisioning

3.2 Commercial setting

In the case of Tyrol, the most intensively debated aspect was the economic remuneration for the use of the municipal fiber network. The agreement that has been found and which is being applied throughout Tyrol is that network operators pay 30% of the revenue that is generated by their end-customers as revenue share to the municipalities. This value also is related to projects where a 3-Layer model is implemented and where the experience is that each of the 3 layers will get approximately one third of the revenue generated by the end-user. Looking at prices that are relevant in the market today, municipalities will receive a revenue of approximately the same value as in unbundled (copper) line as of today. The reason therefore is that only the "basic internet access revenue" is being taken as a basis for the calculation of the revenue share.

4 Experiences made in Lienz

4.1 Tasks and challenges

Lienz is considered to be a pioneer municipality not only in Tyrol but also in Austria. The approach selected by the 15 municipalities can serve as a blueprint for others with respect to the success factors but also with respect to detours and possible mistakes that have been made.

A key factor in the overall project was that broadband was seen as paramount for the development of the region and a decisive factor for private and business users. Broadband infrastructure was considered to be the basis for the future improved development of a geographically disadvantaged area. With the realisation of the municipal fiber network, key improvements for education, social work, the quality of living and businesses as well as tourism could be given. This has generated future perspectives for the region.

The municipality had to deal with a number of specific challenges such as

- the integration of all local and regional stakeholders,
- the distribution of information to the public in order to raise awareness and to keep everybody in the loop,
- to consider dynamic developments of digitization not as a threat but as an opportunity,
- to build up and develop own know-how on the municipal level,
- to implement a new form of project management across municipalities,
- to ensure that financing and state aid is available to support the project long-term,
- to ensure that the quality of planning is sufficient,
- to conduct increased public relations and communication compared to other issues of municipal relevance,
- to speedily implement the network so that synergies in the deployment can be realized,
- to clarify open issues from a legal or regulatory perspective.

4.2 The incumbent's reaction

It is interesting to observe how the incumbent that did not enter into a contract right away reacted to the approach of the local municipalities. The following could be observed:

- Before the municipal rollout, A1 Telekom Austria ("A1 TA") did not show any interest in rolling out more broadband availability in the region of Lienz. No confirmation about any initiatives by the incumbent were given. The key argument in this respect was that the incumbent was unable to afford rollout in such regions without state aid due to the lack of economic viability.
- However, after (!) the local municipalities had started their project, the Lienz valley became prioritized in the strategic approach of A1 TA and a self provided FTTC rollout took place without any state aid. Thus, the speed by which the local municipality had started the project obviously had an impact on A1 TA and their approach also to deploy higher bandwidths without state aid.
- Furthermore, an intensive marketing campaign of the FTTC network started in order to agree on contracts with customers in the region and to "lock" them in for two or three years.
- Also, the interest of A1 TA to become provider on the municipal network was rather limited. The focus continued to be on its own copper network.

5 Summary

The project as it is taking place in Lienz can be summarized as follows:

1. The municipalities in the region have taken the role as pioneers for the Tyrolean broadband strategy.
2. However, they are confronted with a large number of tasks for the deployment and the operation and maintenance of the network.
3. The economic viability of the project is still on a very narrow edge. Therefore, it is required to have an optimal project scaling.
4. The key aspects that remain as tasks for the municipality are network operation, maintenance, installation, fault repair, inspection and documentation.
5. The legal framework for tendering these tasks needs to be observed in order to avoid any problems.
6. The state of Tyrol continues to support the municipalities by drafting blueprints, developing standards and models and to communicate best practices.

With respect to the project of the current stage, the following conclusions can be drawn:

1. The fiber concept is a main pre-requisite that should be decided upon in the planning phase.
2. The connections and the access network are spliced. This allows to minimize the effort in the set-up of a subscriber connection.
3. It is important to draw the line between responsibility of the municipalities and the property owner. The demarcation point is the boundary of the property.
4. The set-up of the first connection in a multi-dwelling unit requires the blow-in of a fiber cable from the nearest fiber distributor and a connection in the central office.
5. It is key to provide for an adequate documentation of the fiber connections including geo-referenced data.
6. Since there are only fixed joints in the access network the assumption that the number of faults should be 3% of all access lines per annum appears to be feasible.

7. Since individual municipalities are small, synergies and economies of scale between communities should be used.
8. Outsourcing of tasks is something to public procurement law. An adequate process that this is in line with legal requirements needs to be identified.

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