

Broadband Strategy Styria 2030



Das Land
Steiermark

3 REASONS FOR THE BROADBAND STRATEGY

1. THE FUTURE IS HAPPENING NOW.

Economic and social development is closely linked to digitalisation.

2. GOOD INFRASTRUCTURE IS A LOCATION FACTOR.

In particular, this also applies to fast connections.

3. OPPORTUNITIES ON THE PERIPHERY.

Broadband makes decentralised work and lifestyles easier.

Companies can now act globally, regardless of where they are actually located.

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Dear Sir or Madam,

In the age of digitisation, fast internet is a fundamental requirement for positive regional development. Today, it's only the availability of the right broadband infrastructure that allows companies to offer their products and services worldwide and survive in international competition - an essential prerequisite for added value, jobs and thus quality of life. But many other areas of life are also increasingly being digitised. High-performance data connections are therefore becoming increasingly important for private households as well.

It must therefore be our concern to provide all of Styria with high-speed internet as quickly as possible. That means pushing ahead with broadband penetration, especially in rural areas. The founding of the Styria broadband and digital infrastructure company sbidi allowed us to take an important step in this direction. In this way, we are driving the expansion of broadband infrastructure, especially in those regions where private providers have shown no interest.

The current broadband strategy provides the framework for the specific steps to be taken in the coming years. This will allow us to light the broadband rocket and connect the whole of Styria to the information superhighway.

MMag.^a Barbara Eibinger-Miedl
Provincial Councillor for Economic
Affairs

NEW STRATEGY FOR DIGITAL INFRASTRUCTURES**EXECUTIVE
SUMMARY**

Digitisation is no longer a vision, but an economic and social reality. Broadband is now a basic requirement for high-performance connections. As close as possible, with maximum power and functionality, and with the greatest degree of penetration. Great infrastructure is also a clear plus point for any location. Of course, this also applies to broadband coverage.

The Province of Styria has therefore developed a new strategy for digital infrastructures. Following on from 2014's Highway 2020 broadband strategy, this will shift the previous focus to technical, economic and regulatory development. The intention is to align the strategy for the coming decade, even if it is still difficult to assess today how exactly things will be in 2030.

A QUICK LOOK AT WHAT'S BEEN ACHIEVED

The time horizon chosen so far and the current developments at EU and federal level make it necessary to review the achievement of the defined goals. Following on from this, new strategic goals should be defined, while operational specifications should be drawn up and the appropriate measures determined.

The analysis of Highway 2020 (Chapter 2) has shown that

- the target of supplying up to 30 Mbit/s for all households and companies set for 2018 has not yet been fully achieved;
- The 2020 target concerning fibre optic access points has been achieved in every municipality;
- The 2022 target concerning transfer rates of up to 100 Mbit/s can be achieved for all households and companies, but corresponding acceleration measures will be necessary for this;
- The Province of Styria has taken a number of measures that were not directly included in the Highway 2020 strategy, but which are geared

towards the future and intended to accelerate broadband expansion.

In view of the growing demand for bandwidth, the increasing importance of high-performance internet access (especially mobile) and the new, expanded role of the public sector in creating the appropriate infrastructures (Chapters 2 and 3), Styria has already introduced numerous measures. It is necessary to highlight the founding of the sbidi (Steirische Breitband- und Digitalinfrastrukturgesellschaft m. b. H., Chapter 2.2), with which substantial funds (Chapter 5) are provided for the expansion of underserved areas.

SBIDI LOOKS AT AREAS WHERE THE MARKET IS NOT ACTIVE BY ITSELF.

It was therefore also necessary to align the infrastructure strategy with the state of the art and the actual situation in Styria (see Chapter 4).

The regional master plans should therefore also be summarised in a Styria-wide master plan, and should outline and guide future expansion (Chapter 6).

The province's previous and future strategy was discussed, as well as the role of market participants, during round table talks with both market players and companions (Chapter 7). This allows areas of action to be defined that add impetus for the Province of Styria's additional activities. All of this preliminary work led to the definition of strategic and operational goals, as well as measures (Chapters 8 to 10) that are summarised as follows:

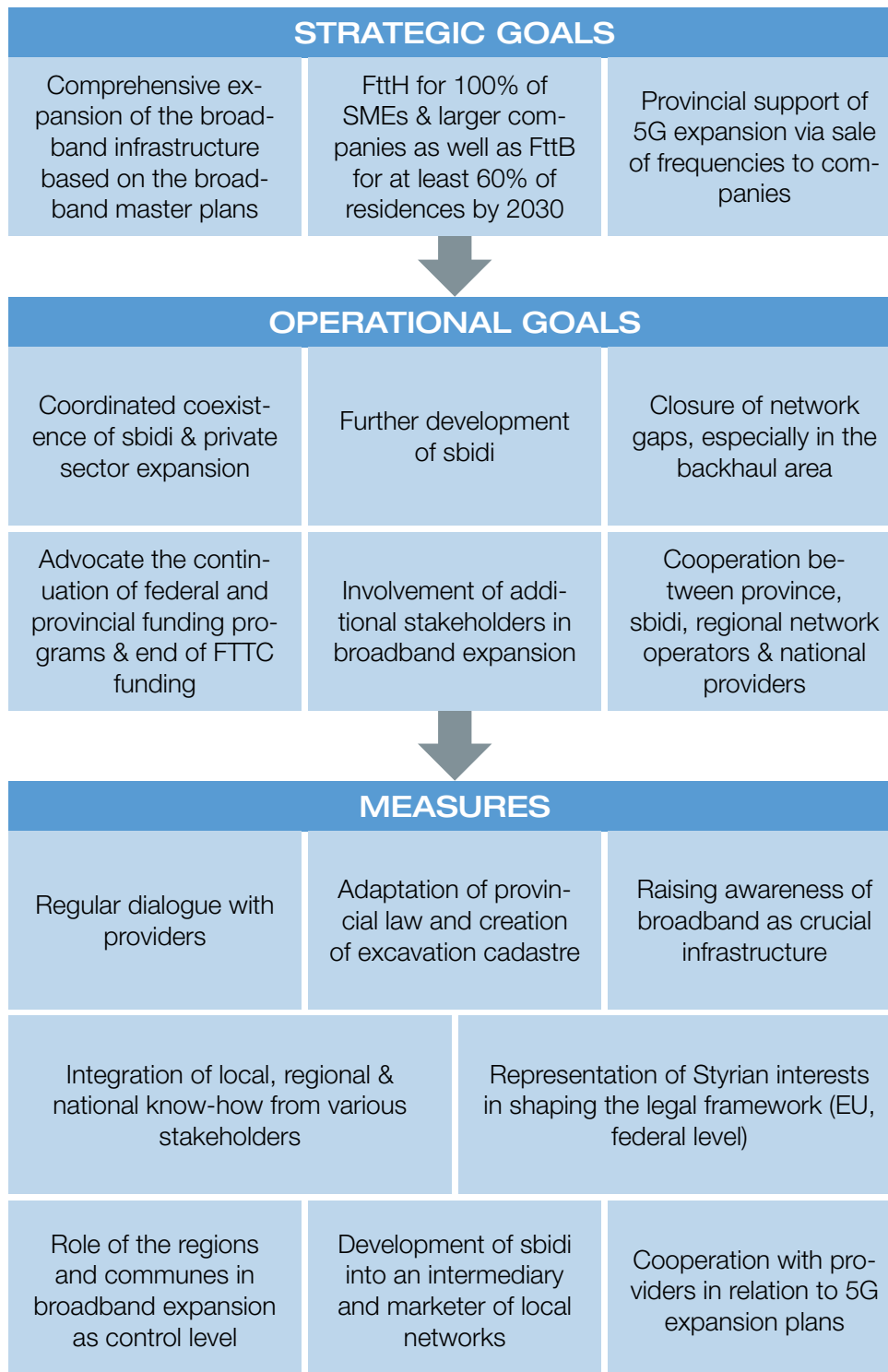


Figure 1: Goals and measures

If one compares the contents of the previous Highway 2020 strategy with Broadband Strategy 2030, the following characteristics, parallels and differences emerge:

	HIGHWAY 2020	BROADBAND STRATEGY 2030
Strategy	<ul style="list-style-type: none"> • Expansion of the broadband network and ICT infrastructure 	<ul style="list-style-type: none"> • Expansion to gigabit capacity as an essential service of general interest.
Goals	<ul style="list-style-type: none"> • Bandwidth goals 	<ul style="list-style-type: none"> • Infrastructure goals: Fibre optic penetration as close as possible to every company and household
Measures	<ul style="list-style-type: none"> • Joint laying of infrastructure • Shared use of existing infrastructure • Development of the infrastructure atlas • Financial stimulus for private investors 	<ul style="list-style-type: none"> • Coordinated expansion along the Styrian broadband master plan • Adaptation to technical, economic and regulatory developments • Coordination and mediation function of sbidi as well as its further development
Budget	<ul style="list-style-type: none"> • Federal broadband billion • EAFRD co-financing • Private funds 	<ul style="list-style-type: none"> • Broadband billion and EU funds • Private sector expansion • Province/sbidi

Figure 2: Broadband Strategy 2030 at a glance



The importance of future-proof fibre optic networks remains undisputed in terms of infrastructure and today is viewed as a basic requirement serving the public interest.

1 INTRODUCTION

BROADBAND. WHY DO WE NEED IT ANY- WAY?

The availability of fast internet access is already essential for almost all areas of life and work. The progress of digitisation, with all its potential and opportunities, is based on the comprehensive availability of reliable, high-performance data connections. High-performance networks are the “infrastructure” of tomorrow.

It is of central importance that citizens, companies and administrations benefit equally, even if their needs and applications are different.

Why do we actually need this? The importance of future-proof fibre optic networks remains undisputed in terms of infrastructure and today is viewed as a basic requirement serving the public interest. Our need for fast internet access is recognised today by politics, business and the general population. The increase in broadband traffic and the demand for high-performance technologies will continue¹.

Data volumes continue to rise, while speed increases by breathtaking proportions. The following illustration by the regulatory authority RTR GmbH² is an example of the development of the monthly data volume on a quarterly basis between the years 2016 to 2019 (total volume in terabytes).

¹See EU (2016b) and also Nielsen Norman Group (2018)

² See RTR GmbH (2019a)

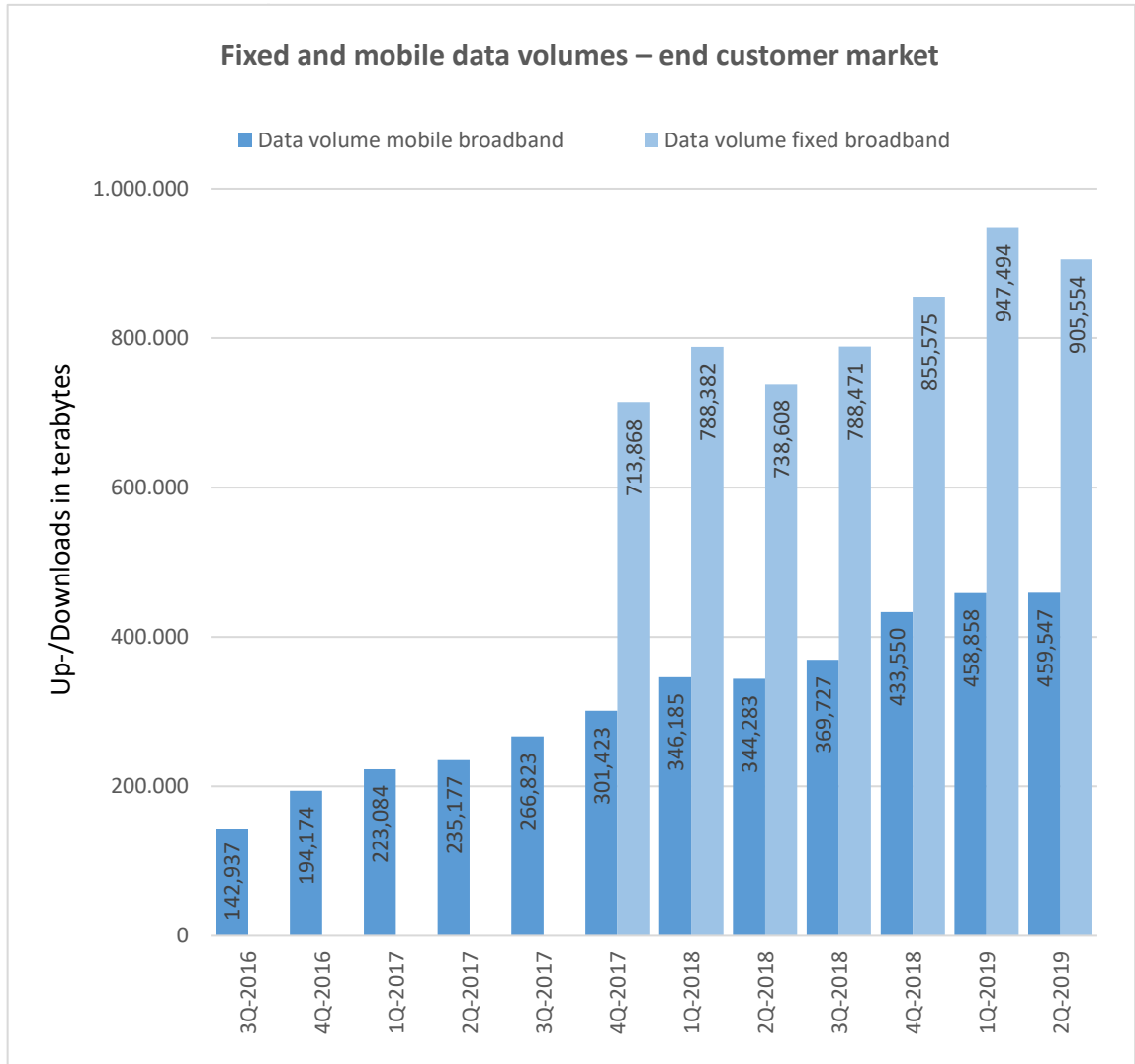


Figure 3: Data development in Austria, source: RTR Telekom Monitor 3rd quarter 2019

Currently, there seems to be no end to this continuous growth in data.

Against this backdrop, the Province of Styria has set itself the goal of advancing network expansion to the best of its ability and ensuring the establishment and availability of the required infrastructures.

2 FROM HIGHWAY 2020 INTO THE FUTURE:

WHAT'S NEXT?

2.1 STATUS QUO

The Styria Highway 2020 Broadband Strategy was unanimously adopted in autumn 2014 by the provincial government and parliament of Styria. After a thorough evaluation of the goals and measures formulated at the time, the current situation is as follows.

2.1.1 GOALS OF HIGHWAY 2020

1. By 2018, **high-performance and fast broad-**

band connections of up to 30 Mbit/s should be made available to all households and businesses.

2. By 2020, **fibre optic access points should be made available in all Styrian communities.**

3. By 2022, **all households and businesses should be supplied with high-performance, ultra-fast connections with bandwidth rates of up to 100 Mbit/s.**

GOAL 1 - Broadband connections of up to 30 Mbit/s

In 2019 the following picture emerges concerning goal 1:

Downstream bandwidth	Households ³	Businesses
0–2 MBit/s	4%	-
3–30 MBit/s	21%	30% ⁴
31–100 MBit/s	39%	32%
101–1000 MBit/s	36%	37%
> 1000 MBit/s	-	1%

Table 1: Supply of broadband connections in Styria⁵

³ Covers primary and secondary residences

⁴ Value relates to the 10–30 Mbit/s category, but is included in the 3–30 Mbit/s category for better illustration.

⁵ Office of the Provincial Government of Styria (2019a) and (2019b)

According to a statistical analysis by Department 12 Economy and Tourism and Department 17 Provincial and Regional Development, 1,025,984 main and secondary residences⁶ have broadband connections of at least 30 Mbit/s available, which corresponds to around 75% of all primary and secondary residences in Styria. For businesses, the number is 32,011 (69%). Around a quarter of the residences and almost a third of businesses remain below the 30 Mbit/s limit. Thus, the goal of supplying all residences, households and businesses with at least 30 Mbit/s by 2018 has not been fully achieved. This means that there is still an ongoing need to significantly improve the supply situation in Styria.

GOAL 2 - Fibre optic access points (2020)

The goal of making fibre optic access points available in all communes in Styria by 2020 has almost been achieved. As of 2019, 282 out of 286 communes in Styria now have a fibre optic access point. Expansion projects are in preparation for the remaining four communes. This goal can thus be achieved in 2020. The challenge going forward will be the further expansion of the fibre optic network within the communes to include private households and businesses.

GOAL 3 - Broadband connections of up to 100 Mbit/s (2022)

As of 2019, around 75% of all residences in Styria can be supplied with NGA (Next Generation Access over 30 Mbit/s), around 25% are below 30 Mbit/s. 498,373 residents (approx. 36%) can be supplied with broadband connections of at least 100 Mbit/s. Conversely, this means that 64% of Styrian citizens do not yet have this option. The situation is similar for business connections. 69% of Styrian businesses are currently NGA-capable, and 38% achieve broadband rates of over 100 Mbit/s (as of July 2019). Correspondingly, however, 62% of the companies are not yet equipped with the bandwidth from the Highway 2020 target. The main reason lies in the sprawling structure of settlements in Styria, which makes high-quality broadband expansion very costly. The goal of high-performance and ultra-fast connections with transfer rates of up to 100 Mbit/s for all households and businesses by 2022 therefore represents a major challenge for the province, communes and operators. The activities initiated by the Styrian broadband and digital infrastructure company sbidi, the commitment at regional and commune level as well as the efforts to procure the share of federal funding which is still available, demonstrate that significant progress is possible in the remaining three years until 2022. Admittedly, the formulation of a more future-oriented infrastructure goal appears to be more suitable for further implementation.

⁶As of January 2019

2.1.2 HIGHWAY 2020: THE MEASURES

Four measures were formulated in the Highway 2020 strategy to achieve this goal.

1. Synergies through joint relocation of infrastructure for planned civil engineering work
2. Synergy effects through shared use of existing infrastructures (e.g. dark fibre, empty pipes, antenna locations)
3. Development of the Styrian infrastructure atlas
4. Offering financial incentives to private investors and communes

The implementation of these measures can be assessed as follows:

- In January 2017, an amendment to Article 92b of the Styrian Building Act came into force. Accordingly, a transfer point similar to that for other infrastructures must be provided for necessary high-speed infrastructures for electronic communication in new buildings and major renovations.
- Department 7 of the Province of Styria (communes, elections and rural road construction) has developed a cable routing machine ("Layjet") in cooperation with private enterprise, which can

lay the empty piping for the fibre optic networks in the street verge in a single step. This project supports the cooperation of the infrastructure operators and contributes to a reduction in costs by allowing different laying work to be carried out at once.

- The infrastructure joint venture between the Province of Styria and Energie Steiermark, which has been in existence since November 2016, aims to increase the use of available infrastructures, e.g. cable ducts of energy suppliers.
- As part of a promotional campaign by the Styrian usiness Promotion Agency (SFG), businesses were able to request financial support for initial connection and "upgrade" costs for broadband internet or expenses for the "last mile" (i.e. external costs for installing the infrastructure between the operator's network and the business).
- Since December 2017, communes may also apply to Department 7 of the Province of Styria for allocation of funds for broadband expansion projects.



2.1.3 HIGHWAY 2020 RECOMMENDATIONS

Six recommendations were made based on the goals and measures.

1. **Create awareness**
2. **Develop funding models for new infrastructure** and broadband connections for businesses
3. **Make the appropriate budget available at the provincial level** and use federal and EU funds
4. **Establish broadband coordination centre at provincial level**
5. **Set up broadband control group at the provincial level**
6. **Create a legal framework within provincial legislation**

WHAT HAS HAPPENED?

An interim evaluation of the measures

- There is an ongoing transfer of information between politics, communes, business and the populace, e.g. in the form of mayoral conferences and regional assemblies. Information events are also held about funding measures (e.g. at federal level) or technical developments (e.g. 5G). Decision-makers at all levels are now sensitised to the subject of broadband.
- For the period 2014 to 2020, funding of €53.2 million was made available for broadband expansion across Austria in the programme for rural

development (EAFRD). Of this, Styria accounts for around €13 million. These funds were fully exhausted in the two EAFRD calls. The Province of Styria is providing co-financing for this.

- A share of €240 million is available for Styria from the federal government's billion-euro broadband fund, of which €85.2 million in funding commitments have so far been accessed. The last federal tender was launched at the end of 2019. Funding projects of over €100 million can be expected in the ongoing or upcoming calls. The Province of Styria has taken extensive measures to increase this utilisation of funds. In addition, Styria is trying to extend the current funding programs at federal level.⁷
- With regard to the CONNECT programme for the connection of schools and SMEs, Styria comes first in a nationwide comparison. Of the €5.2 million, Styria thus accounts for a total of €2.2 million.⁸

⁷ According to the recipients of the funding, the above-mentioned €85.2 million is largely divided between A1 Telekom (€47.8 million or 56%), municipal utilities / energy providers (€17.2 million) and sbidi (€13.1 million).

⁸ See BMVIT (2019c)

	A1	T-Mobile	sbidi	Communes	Municipal utilities / energy providers	Miscellaneous	Σ
Access	€25,856,168	€14,640	€9,980,578	€498,851	€2,739,856	€ -	€39,090,093
EAFRD Access	€6,402,504	€ -	€3,159,655	€ -	€4,382,352	€ -	€13,944,511
Backhaul	€15,599,007	€35,045	€ -	€ -	€6,568,106	€23,893	€22,226,051
Empty pipes	€ -	€ -	€ -	€2,237,149	€3,534,004	€1,929,395	€7,700,548
Connect	€ -	€ -	€ -	€2,069,372	€14,604	€170,111	€2,254,087
Σ	€47,857,679	€49,685	€13,140,233	€4,805,372	€17,238,922	€2,123,399	€85,215,290

 Table 2: Federal funding programmes & funding recipients⁹

The province also supports businesses that invest in high-quality broadband connections through the Steirische Wirtschaftsförderungsgesellschaft (SFG).

Regional master plans are also financed and there are funding allocations for communes.


WHAT CAN YOU FIND & WHERE?

- The broadband coordination office is located in the Economy and Innovation Unit in Department 12 - Economy and Tourism and is the province's

first point of contact for market participants and stakeholders, private individuals and businesses when it comes to broadband expansion.

- At the provincial level, a broadband steering committee - consisting of stakeholders, province departments and interest groups - was first set up. This steering committee was replaced by an advisory board that coordinates the implementation of the broadband strategy in Styria.

⁹See BMVIT (2019b), as of 25 November 2019



The Province of Styria supports its
communes in their broadband projects
through sbidi.

2.2 SBIDI: WE'RE PICKING UP SPEED!

The Steirische Breitband- und Digitalinfrastrukturgesellschaft m. b. H. (sbidi) began its activities in spring 2019. It has the following tasks:

- Provide consistent advice to Styria's communes
- Coordination of broadband activities at local level
- Expansion of the broadband infrastructure in "white spots" in Styria (areas with a coverage of less than 30 Mbit/s)
- Improved use of existing infrastructure
- Intensified exploitation of the broadband billion
- Economical and efficient expansion of networks

Network expansion in "white spots" is taking place within selected commune projects with shared cost coverage by sbidi, communes and federal subsidies. These "white spots" are still present in almost all of Styria's communes, the majority of which are in eastern and south-western Styria. sbidi's expan-

sion is based on certain criteria, such as the current broadband availability in the fixed network, the existing local core coverage, the proportion of commercial locations in a municipality and the initiative of the communes and local contacts. The need, demand and the willingness of the population and companies to actually order a higher-quality connection ("take rate") are also important.

sbidi builds the passive infrastructure, which subsequently remains in its possession. Active network operation is advertised publicly and generates income. The active network operator may also offer services in this network and must grant third parties non-discriminatory access to this network.

In addition, sbidi advises communes and regions on the basis of the Styria-wide master plan, taking into account the local conditions and the existing providers, with regard to the best possible variant for network expansion.

The activities of the sbidi are as follows:

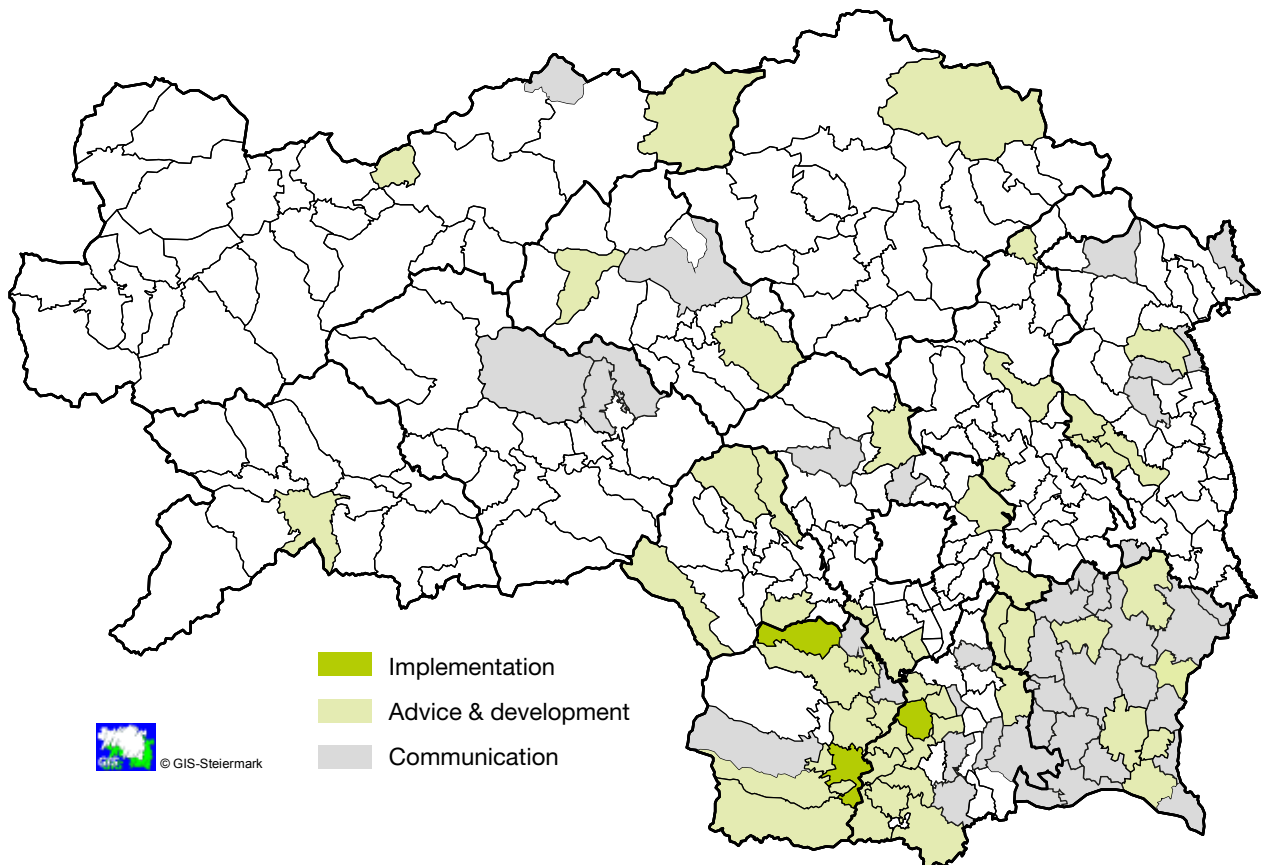


Figure 4: Activities of the sbidi (as of February 2020)¹⁰

¹⁰ See sbidi (2019), <http://www.sbidi.eu/index.php/about>

2.3 PERSPECTIVES OF THE MARKET PARTICIPANTS

Numerous stakeholders in broadband expansion within Styria were interviewed in individual meetings and workshops, allowing a comprehensive picture of opinions and perspectives to emerge.

The private and public market participants rate the results of Styria's broadband strategy achieved so far as largely positive, but also see aspects that can still be improved. The most important positive results mentioned of Highway 2020's goals include the development of regional master plans and the establishment of sbidi. Furthermore, the improved coordination and the associated increased awareness of the issue of broadband among all those involved were emphasised.

One development that is unfavourable for achieving the strategic goals is the expansion of FttC (Fibre to the Cabinet - fibre connection to the street cabinet), which is still being carried out and also funded by the federal government, which regional stakeholders in particular do not consider sensible, whereas national providers insist on a free choice of technology for broadband expansion.

With regard to the broadband strategy in general, the measures that led to a 'culture of collaboration', such as the bundling of interests in sbidi and implemented regional measures (SFG connection funding, development of a new laying machine - Layjet) were particularly welcomed. The Styria-based op-

erators highlighted as positive that the processing of corporate funding in particular is significantly easier and less bureaucratic than the federal funding programs.

Weaknesses are seen in the bandwidth targets, as they leave a lot of room for interpretation. Furthermore, the learning process for communes and their involvement in the decision-making processes on broadband issues and infrastructure expansion was criticised. Despite numerous information campaigns, awareness of the importance of broadband expansion has not yet been raised in all communes. Sometimes it is unclear how funding can be accessed.

Many market participants seem to want to switch to an infrastructure goal for the 2030 strategy. With regard to the technologies to be used, the overwhelming opinion is that a fibre-to-the-building connection (FttB) with the option of upgrading to a fibre-to-the-home connection (FttH) would make the most sense, taking into account requirements and costs. Building on top of existing cable networks with public finances should be ruled out.

Due to the low growth rates in bandwidth demand, some large national operators would like the offer to be based on bandwidth targets, irrespective of the technology.

3 ANALYSIS OF CURRENT FRAMEWORK CONDITIONS: IN THE FAST LANE

3.1 EU DIGITAL STRATEGY

Digital Agenda Europe 2020 is the EU's program for information and communication technology (ICT) and thus also provides the relevant framework for Styria. The EU's strategic goals for 2025 are:

- All areas of socio-economic importance, such as public institutions and businesses, should have a symmetrical gigabit connection
- All European private households should have an internet connection with a download speed of at least 100 Mbit/s
- It should be possible to upgrade these to gigabit speeds
- All urban areas and the main traffic connections are to be continuously supplied with a 5G connection
- Interim goal for 2020: 5G connection as a full commercial service in at least one major city in the country

Styria's expansion plans can be easily embedded within these goals as they are quite similar. One of the EU measures is to promote fast and ultra-fast internet access, from which Styria can benefit. Also of particular interest are guidelines that make accessible new high-performance networks, consisting of fibre optic connections to the end-user building - also for co-investments. This measure could facilitate the expansion of FttB in Styria.

3.2 FEDERAL BROADBAND STRATEGY

The federal broadband strategy's vision is that "by 2030 Austria will have symmetrical gigabit-enabled access networks across the board" - on the basis of a "close-knit fibre optic network in conjunction with universally available mobile coverage". It should therefore be possible to advance digitisation everywhere under the same conditions.¹¹

The goals formulated at federal level - as part of the broadband strategy "Austria's way into the gigabit society" from 2019 - are:

- Equal opportunities for all Austrian citizens to be able to fully participate in the opportunities of digitisation. This means that high quality and affordable access to applications and services must be available for everyone.
- Phase 1: Nationwide range of ultra-fast broadband connections (100 Mbit/s) by the end of 2020
- Phase 2: Market launch of 5G in all provincial capitals by the end of 2020
- Phase 3: Austria 5G pilot country by early 2021
- Phase 4: Offer 5G services on main transport connections by the end of 2023
- Phase 5: Nationwide offer with Gigabit-enabled connections by the end of 2025, including nationwide 5G coverage
- Vision 2030: Nationwide access via Gigabit-enabled connections by the end of 2030

¹¹ See BMVIT (2019a)

Nationwide fibre optic coverage and the relevant connection options are essential for classification of the objectives with regard to broadband coverage. The federal government estimates the costs for nationwide fibre optic expansion at 10-12 billion euros. However, the financial coverage for this is still unclear.

To understand the background: Compared to 2016, the FttB/FttH coverage in Austria increased from 8% to 13% in 2017. The 2019 DESI¹² report by the EU Commission reports coverage with NGA (next generation access with greater than 30 Mbit/s) for over 90% of Austria, but in rural areas this figure is below 60%.

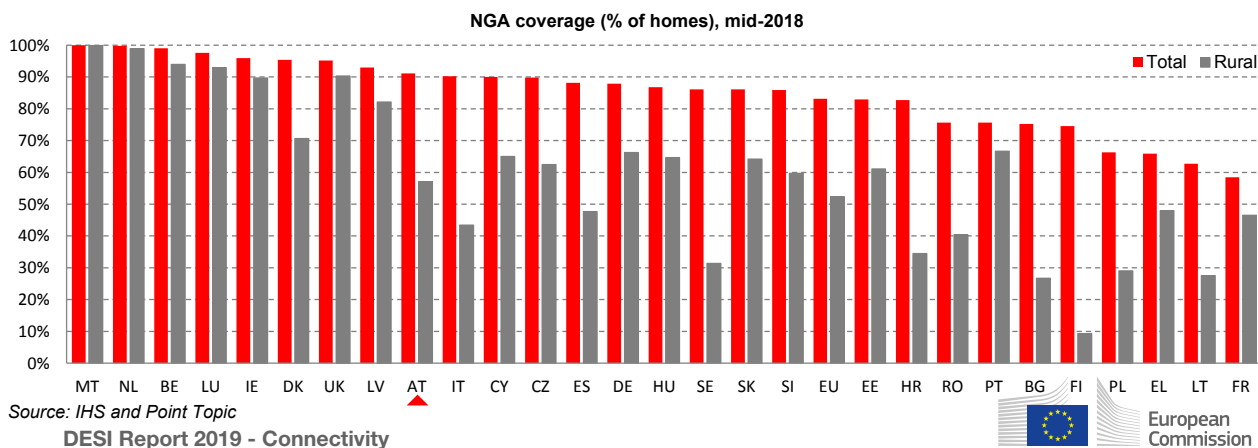


Figure 5: NGA coverage in the EU, in % of households (2018)¹³

The 2019 DESI report by the EU Commission reports coverage with ultra-fast connections (greater than 100 Mbit/s) for almost 60% of Austria, but less than 25% in rural areas.

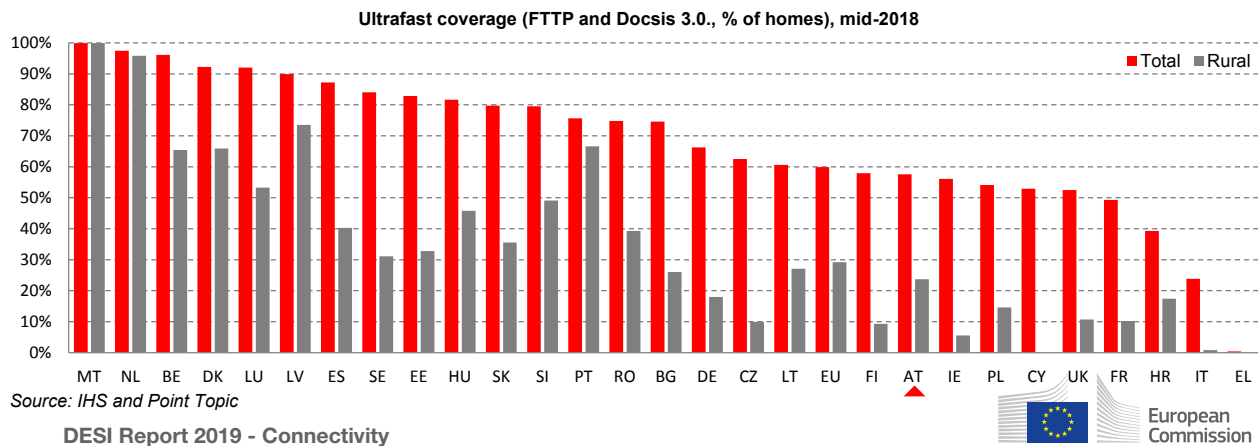


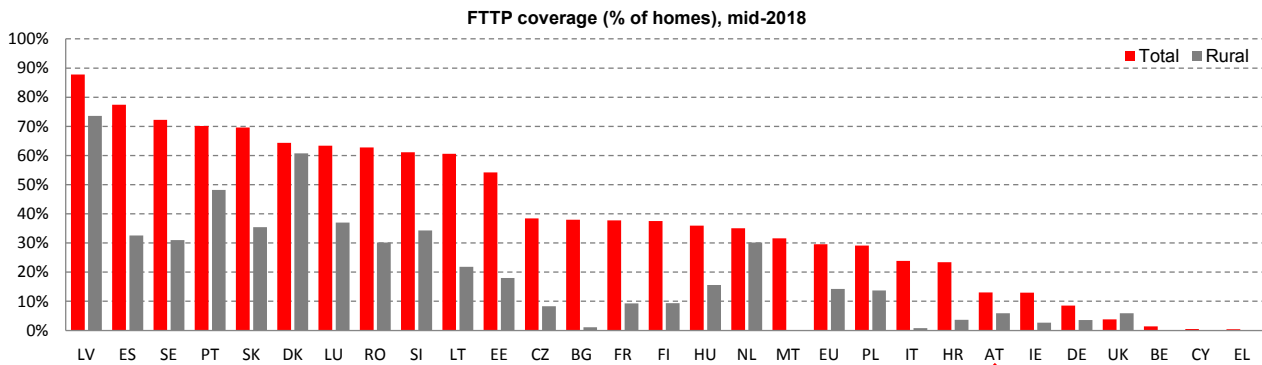
Figure 6: Ultrafast broadband coverage in the EU, in % of households (2018)¹⁴

The 2019 DESI report by the EU Commission reports coverage with FTTP (fibre-to-the-property) for over 10% of Austria, but only around 5% in rural areas.

¹²Digital Economy and Society Index of the EU Commission

¹³EU Commission (2019)

¹⁴EU Commission (2019)



Source: IHS and Point Topic

DESI Report 2019 - Connectivity



Figure 7: FTTP coverage in the EU, in % of households (2018)¹⁵

The higher the bandwidth requirement and the more “fibre-oriented” the comparisons become, the worse Austria does. These figures illustrate a step-by-step improvement, but also the ongoing elevated need for action to install modern, sustainable digital infrastructure based on fibre optics. As part of Broadband Strategy 2030, the federal

government has prepared a detailed report of strategic, legal support and accompanying measures. The most important measures are selected in the following graphic:

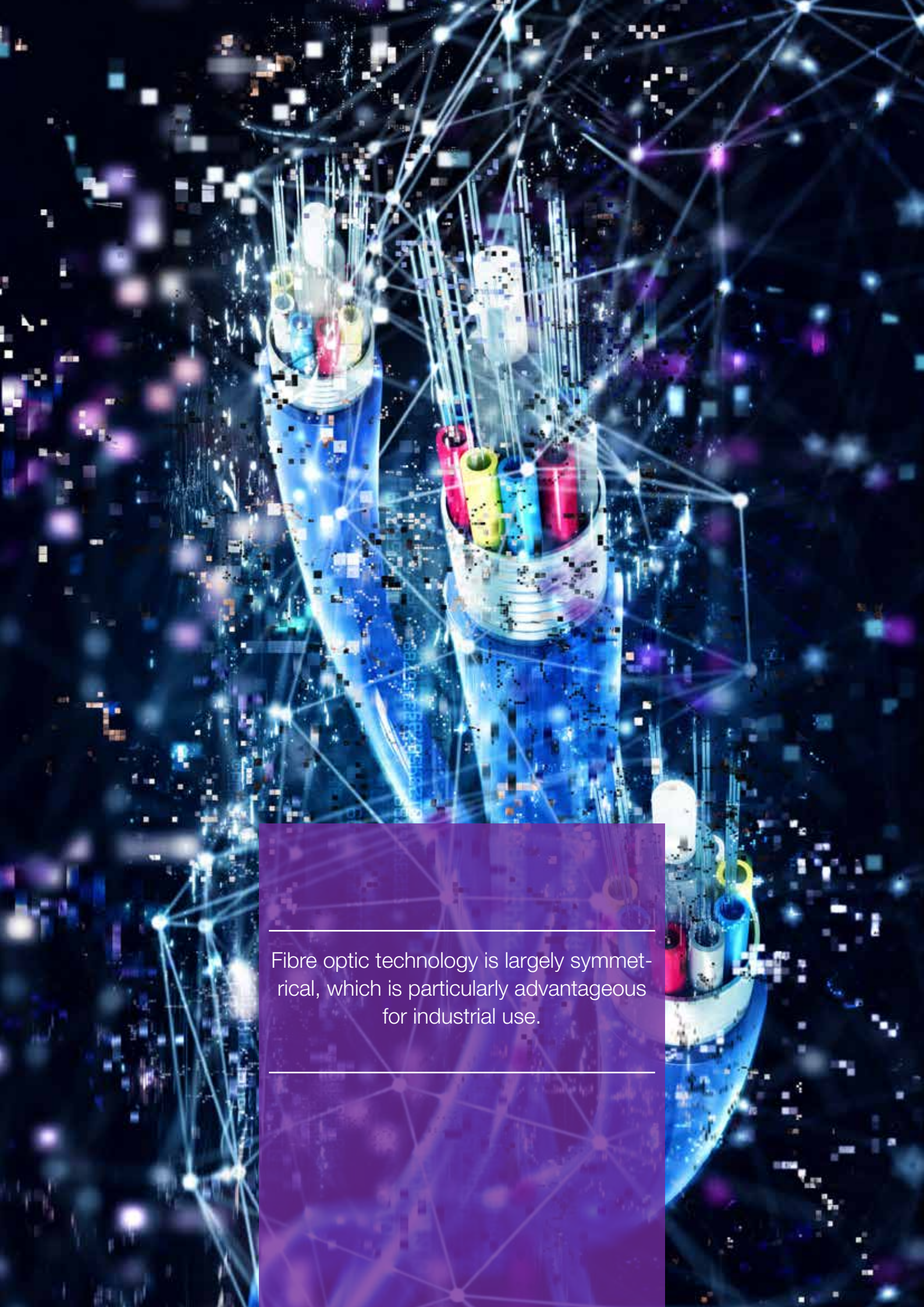
STRATEGIC MEASURES	LEGISLATIVE MEASURES
<ul style="list-style-type: none"> • Scientific analysis of the importance of broadband and ICT • Common infrastructure platform • Standardise access conditions and interfaces to Open Access networks • Definition of the funding area • Model for showing NGA coverage with mobile accesses • Training track - IKI platform 	<ul style="list-style-type: none"> • EU legal framework - redesign funding guidelines • Investment-friendly implementation of the new European legal framework • Legislative measures at the provincial level • Timely allocation of frequencies • Coverage requirements in frequency notifications
PROMOTIONAL MEASURES	ACCOMPANYING MEASURES
<ul style="list-style-type: none"> • Further development of the funding models • Development of models to strengthen the demand for gigabit connections • Promotion of research and technology development on gigabit applications • Promotion of the market introduction of digital applications / products 	<ul style="list-style-type: none"> • Guidelines for co-investments • Establishment of a digitisation agency • Improved coordination of digitisation projects in all departments • Broadband monitoring • Expansion of the broadband atlas • Further development of the network test • Funding compass

Figure 8: Measures in the 2030 federal broadband strategy¹⁷

The goals and measures at federal level are also highly significant for Styria and provide an appropriate reference frame.

¹⁵ EU Commission (2019)

^{16/17} See BMVIT (2019a)



Fibre optic technology is largely symmetrical, which is particularly advantageous for industrial use.

4 ANALYSIS OF CURRENT TECHNICAL PRINCIPLES AND FORESEEABLE CHANGES

FUTURE-PROOF FIBRE OPTIC TECHNOLOGY

A basic distinction is made between **wired technologies** (e.g. xDSL, coaxial cable and glass fibre) and **wireless technologies** (cellular and fixed wireless connections).

- Originally intended for voice transmission, in 2020 **two-stranded copper wire** can also transmit broadband. However: The higher the data rate, the shorter the range. With vectoring technology, data rates of up to 100 Mbit/s can be achieved over a few 100 meters. In order to reach as many customers as possible, street cabinets (so-called cable distributors or ARUs - Access Remote Units) must be set up with fibre optic connection points in the access network (FttC¹⁸). For a bandwidth requirement of over 100 Mbit/s, a gradual increase of the fibre optic connection points is necessary. This repeated increase is more expensive in the long term than expanding a future-proof fibre optic technology.
- With **cable television networks**, data rates > 100 Mbit/s can be achieved, with DOCSIS (Data Over Cable Service Interface Specification) versions 3.0 and 3.1 even data rates in the gigabit range can be achieved. As this technology can only be leveraged economically in densely populated areas, fibre optic technology is preferred for comprehensive coverage with gigabit connections.
- The prevailing opinion in expert circles is that **glass fibre** is the only long-term, future-proof technology for FttB/FttH¹⁹ connections. Optical fibre is routed from a central point to the house, either with point-to-point (P2P) or P2MP ("point-to-multipoint") topology. Fibre optic tech-

nology is also largely symmetrical (same download and upload speed), which is particularly advantageous for industrial use. The nationwide expansion of the infrastructure with fibre optics enables future broadband requirements to be met, but poses an administrative, technical and commercial challenge.

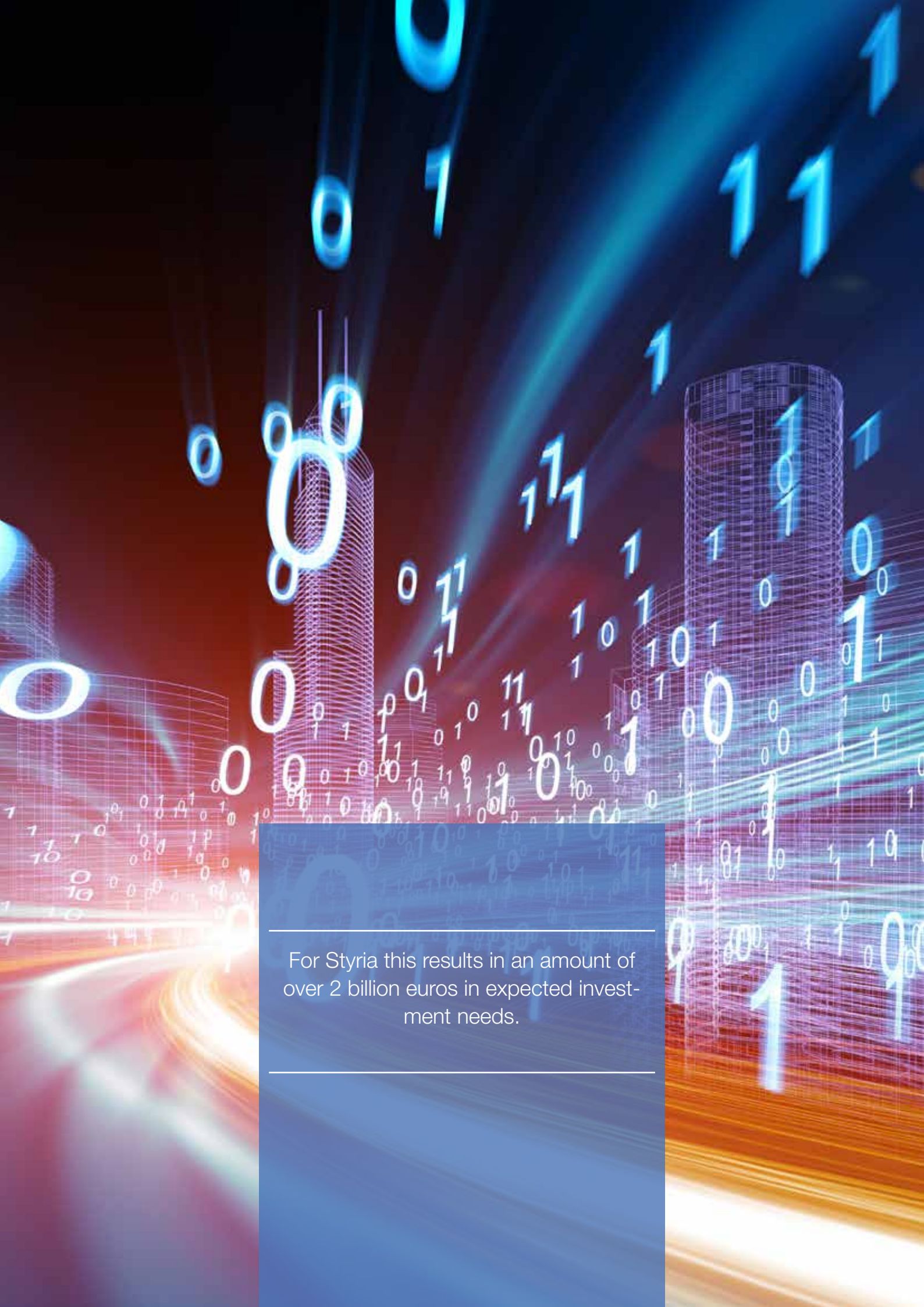
- Currently the **4th generation (4G) of the LTE** and LTE advanced standards with transfer rates of up to 300 Mbit/s is used. Both the European and the Austrian digitisation strategies foresee the use of the 5th generation (5G) in the coming years, which enables data rates of up to 10 Gbit/s. The auction of the 3.6 GHz spectrum that will be used for 5G took place in Austria at the beginning of 2019²⁰. Further auctions in the 700 MHz, 1500 MHz and 2100 MHz ranges are expected to follow in 2020.
- Broadband connections under the name **WLL (wireless local loop)** are generally used outside of the permanent settlement area. The spread of high data rates (including 5G wireless technology) can be used for distances of a few hundred metres to approx. 2 km.

A dense fibre optic network is certainly an essential basis for the implementation of digitisation and for symmetrical coverage at gigabit level.

¹⁸ FttC: Fibre to the Curb/Cabinet

¹⁹ FttB/FttH: Fibre to the Building/Home

²⁰ RTR GmbH (2019)



For Styria this results in an amount of over 2 billion euros in expected investment needs.

5 FINANCIAL OUTLAY:

THE COSTS AND THE BENEFITS.

The expansion to nationwide gigabit coverage can only be achieved with appropriate investment on the part of market participants and the public sector.

At the European level, it is assumed to be in the region of 500 billion euros, for Austria from 10 to 12 billion euros.²¹

A combination of self-funded network expansion by market participants in combination with public funds or initiatives in those areas where no self-funded expansion is expected is assumed for financing.

Accordingly, Styria's expected investment requirements exceed 2 billion euros. The combination of self-funded expansion of the network operators,

synergetic network expansion for civil engineering measures that are already necessary, the use of more cost-effective laying methods, the consideration of existing infrastructures - especially in more densely populated areas - and the planned measures in the state can be expected to significantly reduce these costs.

Nevertheless, a sum in the hundreds of millions is likely to be a realistic investment requirement for all actors to completely achieve the target.

More precise expansion costs and possible synergies can be determined after the Styria-wide master plans are available (Chapter 6) and then derived at the project area level.

²¹ See BMVIT (2019a)

6 INFLUENCE AND PERFORMANCE HORIZON OF THE REGIONAL BROADBAND MASTER PLANS **BASIS FOR THE FUTURE**

The regional broadband master plans are currently being drawn up across Styria. The contracting bodies are the regional management offices. This is intended to lay the foundations for co-installation, coordinated funding projects, finding local providers, community projects and cross-community regional activities. The regional master plans focus on FttH expansion as a goal and therefore support the idea of the necessary infrastructure supply.

The creation of the regional master plans for broadband expansion in 2020 represents an essential basis for the future and for Styria's development as a gigabit society. An expansion strategy is also being developed at commune level in order to take the local conditions into account as appropriately as possible.

In 2020, the regional plans will be combined by sbi-di to form a master plan for Styria within a uniform IT system.



7 ANALYSIS OF THE CURRENT MARKET ENVIRONMENT: **WHO OFFERS MORE?**

The market participants in the broadband market in Styria can be divided into three groups, namely network operators, energy suppliers/ municipal utilities and local providers. Intensive discussions were held with all relevant stakeholders who currently offer services and operate networks in the end customer market.

Particularly noteworthy are the Austria-wide landline and mobile network operators A1 Telekom Austria, Magenta Telekom and Hutchison Drei Austria as well as the regionally active Citycom. The group of

energy suppliers and municipal utilities is comprised predominantly of Energie Steiermark and a number of municipal utilities that have high-performance cable networks in larger cities and regional centres or districts. Some of these providers are also active in several FttB/H projects, such as Feistritzwerke or the municipal utilities in Mürzzuschlag, Judenburg, Kapfenberg or Murau.

A number of local providers round off the market offer in Styria.



8 STRATEGIC GOALS

AND THAT'S THE PLAN

Against the backdrop of market-relevant technical developments, the founding of sbidi, the introduction of 5G, the funding landscape at federal level and the dialogue with market participants, a package of strategic and operational goals with the associated measures was designed, which is presented below.

First of all, based on current developments and the analysis of previous strategic goals for broadband expansion in Styria, there is a time horizon up to 2030. In order to achieve the strategic goals, operational goals are then implemented and measures

are developed to achieve these goals.

The development of these goals and measures should take into account the structure and distribution of roles of the various stakeholders. In view of the numerous actors in the broadband sector, the following picture is intended to show a connection between relevant organisations and the distribution of tasks and roles.

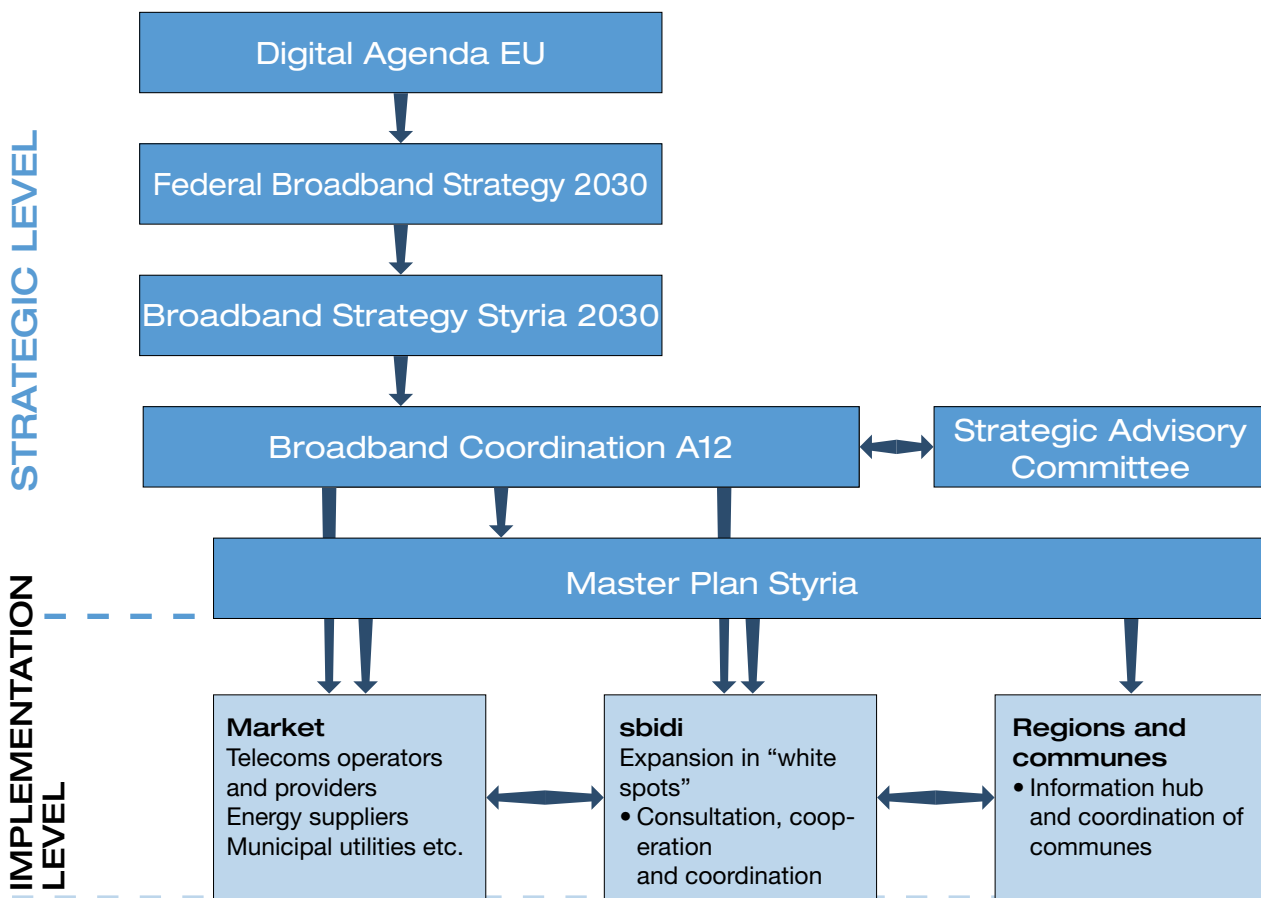


Figure 9: Structural chart of broadband in Styria

The figure relays the role of the various actors from the strategic level, which is derived from the EU's Digital Agenda, Federal Strategy 2030 and Styria's own strategy, to the implementation level within the remit of the regional actors or the public sector, market participants and sbidi. Styria's master plan forms the connecting element between the strategic and implementation levels. It is set up strategically and controlled by the state on the one hand, and is created and expanded within the remit of the regions on the other hand. The expansion is carried out by the network operators or supply companies and also by sbidi within "white spots". The com-

munes play a decisive role at the commune-level, the regions act as an information hub. The regions or communes developed by sbidi are tendered for active network operation and operated by the market participants.

The future distribution of tasks between the provincial administration (broadband coordination - Department 12) and sbidi, based on the present strategy, is as follows:

OFFICE OF THE PROVINCIAL GOVERNMENT OF STYRIA - DEPARTMENT 12 - BROADBAND COORDINATION

- Overall coordination
- Representation at federal government level
- Coordination with other federal provinces
- Office for the Strategic Advisory Committee
- Information hub at provincial level
- Initial consultation
- Steering of sbidi

SBIDI - STEIRISCHE BREITBAND- UND DIGITAL-INFRASTRUKTURGESELLSCHAFT M. B. H.

- Local coordination of broadband activities
- Advice, coordination and cooperation with market participants, regions and Styrian communes
- Coordination of the master plan and establishment of a market platform for joint use and co-installation
- Expansion of the passive fibre optic infrastructure in regions with market failure through better exploitation of the EU and federal funding programs and leasing of the networks to create a non-discriminatory and open market

The following figure gives an overview of the new goals and measures for broadband expansion in Styria:

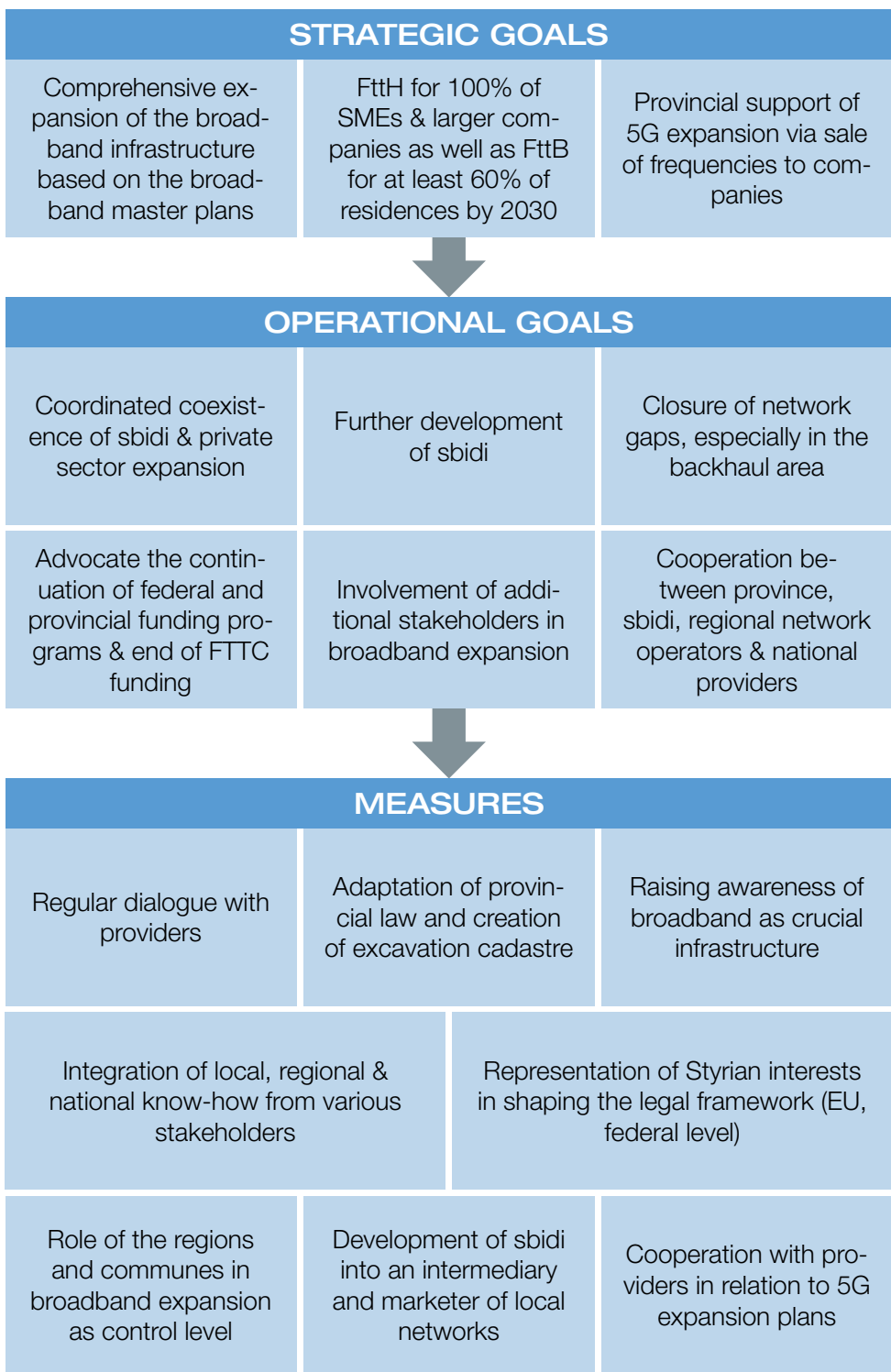


Figure 1: Goals and measures

New objectives by 2030: Connection of households and businesses with sustainable broadband via constantly increasing bandwidth targets is no longer expedient. High-quality broadband connections are the necessary infrastructure in all Styrian regions and are as important as water, electricity or roads. Therefore, Styria is replacing the previous bandwidth target with an **infrastructure target**. It does not seem realistic to be able to connect all residences in the short/medium term. An infrastructure target for business connections (SMEs and large companies) and an FttB target for residences and

small businesses that use private customer products instead of business customer products seem sensible and affordable. It should be noted that not all customers want to change or will for that matter. 5G expansion is to be considered integratively in the planning, because every mobile radio transmission system for 4G and 5G can be equated with a fibre optic connection for a business customer. This leads to the following three strategic goals:

STRATEGIC OBJECTIVES: MISSION 2030

STRATEGIC GOALS		
Comprehensive expansion of the broadband infrastructure based on the broadband master plans	FttH for 100% of SMEs & larger companies as well as FttB for at least 60% of residences by 2030	Provincial support of 5G expansion via sale of frequencies to companies

Figure 10: Strategic goals

- 1) The Province of Styria is striving for the most comprehensive possible expansion based on the regional broadband master plans or the still-to-be-prepared master plan for all of Styria with a sustainable, future-proof **broadband infrastructure**. While the market-driven expansion is primarily spreading out from regional centres and districts, the option of a (partially) publicly financed or subsidized expansion of the broadband infrastructure primarily exist away from the metropolitan areas.
- 2) Expansion target: **FttH availability for 100% of SMEs and for larger businesses as well as FttB availability for 60% of Styrian residences²² by 2030**. For small, medium-sized and larger businesses, the fibre optic connection will not only be a means of communication but also a means of production, especially in industrially-developed Styria. Sole-proprietorships will continue to be partially supplied with private customer products in line with demand. Not all households will purchase a fibre optic connection, but the option for larger sections of the population to use high-quality and sustainable infrastructure will exist. This must also be seen in the light of the ever increasing number of people who work from home.
- 3) In the case of 5G expansion via companies acquiring frequencies, organisational support should be provided at the provincial level, e.g. by providing passive infrastructure including backhaul, reasonable economic conditions can be achieved. Likewise, synergetic expansion planning for all relevant market participants is sensible and should be a goal. 5G expansion is likely to support fibre optic expansion in terms of creating numerous new connections and making it more attractive.

²²FttH = fibre optics right into residential and business units. FttB = availability of fibre optics up to the respective building.

9 OPERATIONAL GOALS:

OUR METHODOLOGY

OPERATIONAL GOALS		
Coordinated coexistence of sbidi & private sector expansion	Further development of sbidi	Closure of network gaps, especially in the backhaul area
Advocate the continuation of federal and provincial funding programs & end of FTTC funding	Involvement of additional stakeholders in broadband expansion	Cooperation between province, sbidi, regional network operators & national providers

Figure 11: Operational goals for digital infrastructure in Styria

The operational goals are derived from the strategic goals mentioned above. The focus is on accelerating the expansion through the stronger role of the public sector in cooperation between the province, sbidi, regions and communes, namely where the market does not provide the required broadband infrastructure. In addition to the “white spots”, there is a focus on connecting localities via backhaul lines.

The expansion in Styria will continue to be based on two pillars: on the availability of funding at EU, federal and provincial level for expansion away from the large metropolitan areas and the practice of cooperation and regional collaboration of all actors involved.

SIDE-BY-SIDE AND TOGETHER

1) The primary goal.

By 2023 there should be a coordinated coexistence of sbidi expansion with backhaul and connection networks in “white spots” as well as private-sector expansion by network operators, usually starting from the regional centres and districts. Building on top of existing cable networks with public money must be strictly avoided.

more important again in recent years does not mean that the entire infrastructure can be built with public money. Private sector investment remains necessary. The right combination and cooperation between the private and public sectors is the key to raising the necessary funds and using them sensibly. In plain language, this means that double investments and overlapping high-performance networks should be avoided.

The fact that the role of the public sector in expanding broadband networks has become

2) The future of sbidi.

An important point is the development of the expansion, the business model and the financing of sbidi for the period from 2023. After the founding of sbidi and the implementation of a number of projects in accordance with the given financial resources, a process for the strategic **further development of sbidi** will have to be started, taking into account the existing framework conditions. The aim is to establish a financially largely independent company on the basis of the knowledge gained in the course of the first few years of implementation - especially with regard to financial development - which will advance the expansion of broadband infrastructure in Styria independently and in the face of dwindling public funds in 2024 and thereafter.

3) Closing the gaps.

Network gaps, especially in the backhaul area, are to be closed on the basis of the Styria-wide master plan. A targeted planning requires a larger investment at the beginning as the basis for a well-organized further expansion. Due to the numerous different regional expansion projects and concepts with many different sponsors, overall planning in Styria is of great importance. This overall planning must take into account all network levels and ensure that the local and regional expansion is also supplied through appropriate connections on the backhaul level, so that the potential of the fast Internet can be ex-

ploited. This also serves to avoid bottlenecks in network operations.

4) Regional and national cooperation.

The regional network operators are already major supporters of broadband expansion. According to their own statements, they can imagine an extended role when it comes to operation of sbidi's own passive networks. National providers have also expressed their interest. The integration of these market participants in the further design of the network expansion, their operation and the provision of an offer that is interesting for end customers is being strongly promoted in order to maximise regional added value and technology development.

5) What will receive funds?

Styria is campaigning for the continuation of FTTH and FTTB funding programmes for broadband expansion at federal and provincial level as well as for **ending FTTC funding** at federal level. FTTC networks no longer correspond to the current state of the art. In addition, the processing of federal funding is to be simplified and the funding framework reconsidered.

In contrast to other federal provinces, Styria has not yet benefited from the broadband billion to the extent planned. In order to change this, Styria is advocating the extension of the existing federal funding programmes beyond 2020, as well as an orientation of funding towards fibre optic networks in order to hold back investments in transition technologies and to make Styria sustainable in terms of technological infrastructure.

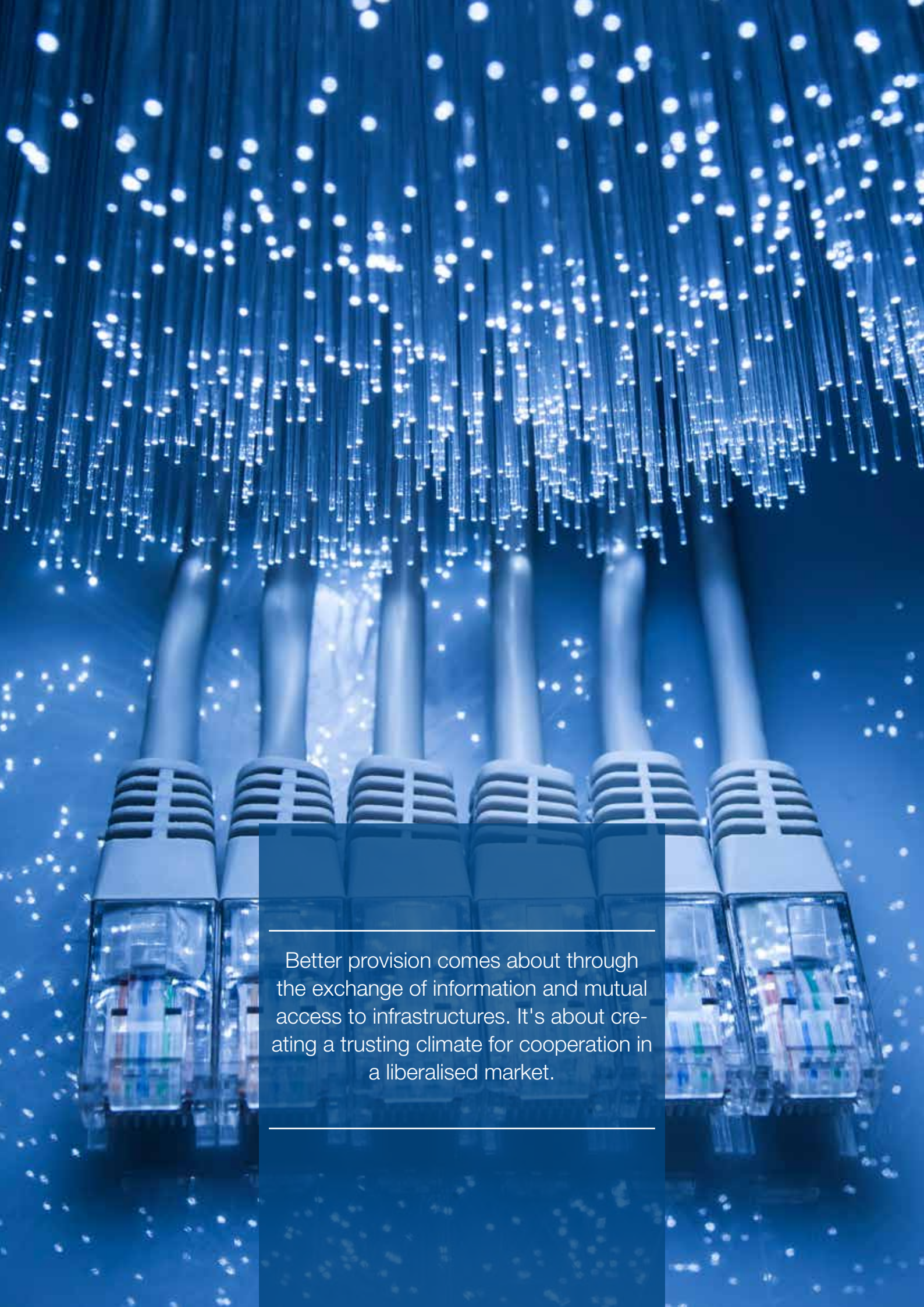
In addition, the current funding process at the federal level, using the example of the empty pipe program, presents the communes in particular with often insurmountable bureaucratic obstacles. Styria advocates for a major simplification. The last mile support program for businesses at the provincial level will be adjusted based on a similar federal program.

An important strategic obstacle to sustainable, future-oriented broadband expansion is the current limit of 30 Mbit/s set by the EU as the definition of Next Generation Access (NGA). This limit is no longer in keeping with the new goals at EU and federal level in moving towards a gigabit society. Therefore, Styria advocates an increase in the limit value - above all to define eligible and non-eligible areas.

6) More partners, more broadband.

One of the declared goals is to involve other stakeholders in the broadband expansion in Styria (e.g. housing industry, modes of transport, etc.) at the level of a nationwide master plan.

Planning and cooperation often arise from a group of experts from the field of operators, the public sector and supply companies. However, broadband infrastructure is also of great importance for other stakeholders and supporting organisations and businesses. Infrastructure owners of all kinds can make meaningful contributions to the increased penetration of the necessary infrastructure. In addition to associations and organisations, the private and non-profit housing industry, transport companies, technology centres and research institutions also play a role.



Better provision comes about through the exchange of information and mutual access to infrastructures. It's about creating a trusting climate for cooperation in a liberalised market.

10 THE MEASURES:

THAT'S THE PLAN

Measures for specific implementation are derived from the above-mentioned goals.

MEASURES		
Regular dialogue with providers	Adaptation of provincial law and creation of excavation cadastre	Raising awareness of broadband as crucial infrastructure
Integration of local, regional & national know-how from various stakeholders		Representation of Styrian interests in shaping the legal framework (EU, federal level)
Role of the regions and communes in broadband expansion as control level	Development of sbidi into an intermediary and marketer of local networks	Cooperation with providers in relation to 5G expansion plans

Figure 12: Measures for digital infrastructure in Styria

The following aspects of implementation are central:

1) Greater connectedness: Increased integration of local, regional and nationwide knowledge and experience of various market players for cooperation in the construction and use of infrastructure.

A future-oriented and sustainable broadband expansion today suffers on the one hand from the restriction in terms of eligibility (30 Mbit/s limit of the EU for so-called “white spots”), and on the other hand from the lack of transparency regarding the existing infrastructure, as well as the joint cost-saving use and co-installation. Every market participant displays behaviour that is optimised for their business. Cooperation is

avoided. Better provision comes about through the exchange of information and mutual access to infrastructures. It's about creating a trusting climate for cooperation in a liberalised market.

2) In conversation: The goal is regular dialogue with providers on expansion measures, information and mutual infrastructure access. The Province of Styria and sbidi will invite local, regional and national market participants and market players to meet and initiate the following:

- Discussion platform about expansion projects
- Sharing information about projects to increase shared use and co-installation
- Mutual offers with regard to the technical and economic provision of intermediate services
- Synergy potential and common approaches for the expansion of 5G and fibre optics

3) Adaptation of provincial law: Measures aimed at improving efficient expansion must be supported by the legal framework. The previous provincial law covers some important aspects, such as in building law, but there are additional areas to be taken up legally. The technological, infrastructural and political advancement requires constant adjustment of the legal framework, including in the following areas:

- a. Greater integration of housing subsidies in the context of expansion with FttB in the area of private end customers
- b. Ensuring co-installation in communal projects by coupling the allocation of requirements for original municipal civil engineering measures by communes to the co-installation of empty pipes according to the master plan. Network concept from sbidi as the basis, maximum possible allocation of requirements for the additional expenditure on material and the necessary co-installation work
- c. Creation of an excavation cadastre at the municipal level to get an overview of the planned excavation work at the municipal level.

4) Representation of the interests of Styria - in the design of a supporting legal framework on the topics:

- a. Implementation of the EU Code in the Austrian Telecommunications Act (TKG)
- b. Co-investment rules of the regulatory authority for the joint use of fixed line and mobile communications infrastructure
- c. Raising/removing the limits for the eligibility of

“blank spots” in European state aid law

The EU code will be implemented in Austria with an amendment. In addition, there is the implementation of subsidiary law through ordinances. The group of European regulatory authorities will also develop numerous recommendations that will be incorporated into the Austrian framework. Here it is important for Styria to closely follow developments at national and EU level and to get involved through statements with other countries or with specific Styrian interests.

5) Raising awareness for broadband: Broadband as an infrastructure issue must be further strengthened at all levels, in communities as well as among mayors, institutions, associations, businesses and the population.

Awareness of the need for an efficient broadband infrastructure has grown at all levels in recent years. This development should continue to be pursued and strengthened, as extensive, sustainable expansion can only be achieved if all market participants, from customers to regulating bodies to active network operators, have a basic understanding of the infrastructure issue and are positive about the expansion. The public sector can act as a role model by exemplifying the internal expansion (connections for public facilities, etc.) and, on the other hand, drawing a positive image of the infrastructure issue and actively promoting expansion at regional and community level.

6) Use and strengthen the role of the regions and communes in broadband expansion: The regions can significantly support the achievement of the nationwide infrastructure goals.

By developing the regional master plans, the regions created an important basis for the management of local and regional expansion projects. For an effective broadband expansion, the integration of the regions is essential. The regional managements, with their know-how and their role as an information hub for the communes and relevant stakeholders, promote awareness-raising and strengthen the expansion strategy.

In addition, projects can be developed and implemented at regional level that further advance broadband expansion tailored to the region.

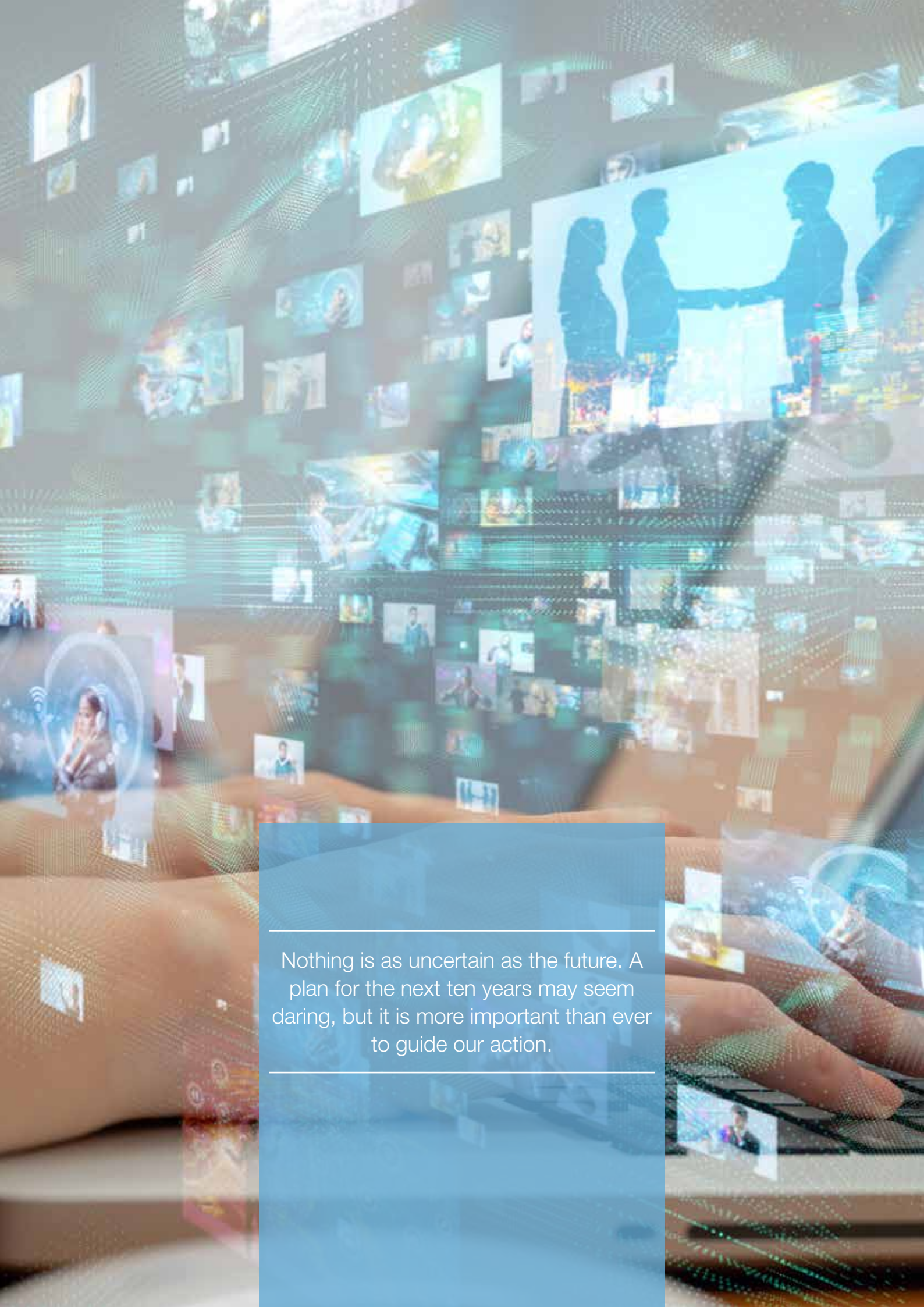
7) Development of sbidi from a pure “network installer” to an intermediary and marketer of local networks: The sbidi business model shows that it is building infrastructure with the support of external service providers, which it makes available to active network operators for a fee as part of a tendering process.

Since sbidi is already involved in the entire process from the establishment to the operation of local networks and is also in contact with the federal government, the province, operators, experts and customers, it makes sense to expand its role to become a network marketer. This role can also be assumed for networks that are not set up by sbidi.

8) Fibre optic and 5G. It is important to influence the providers' 5G expansion plans with regard to cooperative aspects (active network sharing, area coverage) and Styria-specific applications.

The fibre optic expansion is an essential basis for the implementation of 5G technology. From today's point of view, it therefore makes sense to bundle the interests of the providers of 5G and those of the players expanding fibre optics. Cooperation such as a joint expansion or the sharing of local networks can create synergy effects and advantages on both sides. In any case, the requirements for 5G expansion should be incorporated into expansion projects for all the regions of Styria. The mutual exchange about the available infrastructure and planned projects is an essential factor here.

These 8 measures affect all the factors that can be influenced by the province: the legal framework, the operational action of the public sector including the involvement of the regions and communes, the regional dialogue with citizens and businesses, to **target the broadband expansion in Styria and to promote it sustainably in a future-oriented manner.**



Nothing is as uncertain as the future. A plan for the next ten years may seem daring, but it is more important than ever to guide our action.

11 MEASUREMENT USING SUCCESS INDICATORS

NOW IT COUNTS!

The key performance indicators (KPIs) are based on the strategic goals. They can be:

- Availability of FttH/FttB for 100% of SMEs and larger businesses and 60% of residences
 - o Eligible residences/businesses
 - o Availability of fibre access points and backhaul in all regions and communities
- Utilisation of federal funds by sbidi or all market participants (in millions of € per utilisation of the indicative share of Styria in %)
- 5G coverage
 - o Distinguished by area and special destinations

(tourist areas, industrial areas, transport routes)

The achievement of objectives should be regularly monitored with the horizon 2030. This is to ensure a continuous review of the development path or, if necessary, actions and measures can be refined at individual points in order to ensure that the goals are achieved overall.

12 SUMMARY:

THE NEW STRATEGY AT A GLANCE

Nothing is as uncertain as the future. A plan for the next ten years may seem daring, but it is more important than ever to guide our action. We drew our conclusions from experiences with broadband strategy version 1.0 and adapted the strategy, previously dated to 2020, to the new technical and social framework conditions.

sen path, but also understand the strategy as a learning system. Our goal is clear: Styria should be supported as a business location by installation of the best infrastructure possible. The residents and businesses in our province should be able to receive and send information as quickly as possible, regardless of their location.

It's clear: The speed of development in the coming decade cannot be estimated precisely today. However, we are ready to not only follow our cho-

BROADBAND STRATEGY 2030	
Strategy	<ul style="list-style-type: none"> • Expansion to gigabit capacity as an essential service of general interest.
Goals	<ul style="list-style-type: none"> • Infrastructure goals: Fibre optic penetration as close as possible to every company and household
Measures	<ul style="list-style-type: none"> • Coordinated expansion along the Styrian broadband master plan • Adaptation to technical, economic and regulatory developments • Coordination and mediation function of sbidi as well as its further development
Budget	<ul style="list-style-type: none"> • Broadband billion and EU funds • Private sector expansion • Province/sbidi

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Layout: Communications Unit, Martin Janderka

Photos: Gettyimages

14 GLOSSARY

Abbreviations	Meaning
2G	2 nd generation mobile services (incl. GSM)
3G	3 rd generation mobile services (incl. UMTS)
4G	4 th generation mobile services (LTE technology)
4G++	Upgrade to 4G (e.g. LTE advanced or "massive MIMO")
5G	5 th generation mobile communications standard
Access	Access network towards end customers
Active Network Sharing	Sharing the active part of the broadband network
Backhaul	Connection of an upstream, mostly hierarchically subordinate network node to a central network node
BBA2020	Broadband Austria 2020 funding program
BMVIT	Bundesministerium für Verkehr, Innovation und Technologie
Dark fibre	Unwired fibre optic cable
DESI report	Digital Economy and Society Index of the EU Commission
DOCSIS	Data Over Cable Service Interface Specification - transmission standard on cable networks
DSL	Digital Subscriber Line - transmission standard on copper networks
EDV	Electronic data processing
EAFRD	European Agricultural Fund for Rural Development
EU	European Union
EVU	Energy supply company
FttB	Fibre-to-the-Building - fibre optics right into the building
FttC	Fibre-to-the-Cabinet - fibre optics to the street cabinet
FttH	Fibre-to-the-Home - fibre optics right into the living unit
GB	Gigabyte
GHz	Gigahertz
GIS	Geographical information system

GSM	Global System for Mobile Communications (2G) – 2 nd generation mobile communications standard
IKI	Information and communication infrastructure
ICT	Information and communication technology
KPI	Key performance indicators (benchmarks which can be used to determine the performance of activities)
SMEs	Small and medium-sized businesses
Layer 3	Level of service offer in broadband networks
LAYJET	New laying machine, developed in cooperation between the province of Styria and private businesses. It saves costs in broadband expansion.
LTE	Long Term Evolution (4G) – 4 th generation mobile communications standard
LTE-A	LTE advanced – upgrade to LTE
LWL	Light wave conductor
MB	Megabyte
MBps – Mbit/s	Megabit per second
MHz	Megahertz
MIMO	Multiple Input Multiple Output (Antenna technology)
mMIMO	Massive MIMO – bundled application of MIMO Antenna technology
NGA	Next Generation Access – internet connection over 30 Mbit/s
P2P	Point-to-point - continuous single connection between two points
P2MP	Point-to-Multi-Point - continuous connection between two points via a concentration point
RTR	Rundfunk- und Telekom-Regulierungs GmbH
sbidi	Steirische Breitband- und Digitalinfrastrukturgesellschaft m. b. H.
Stakeholder	Interested group / market participant
TKG	Telecommunications Act
UMTS	Universal Mobile Telecommunications System (3G) – 3 rd generation mobile communications standard
Vectoring technology	Technology for upgrading the performance of copper connection cables
WLL	Wireless Local Loop – wireless internet access
xDSL	A general designation for all DSL variants which make broadband use of the telephone line in the connection area
ZIB	Central information point for broadband connection
ZIS	Central infrastructure cadastre – central information point for infrastructure data of RTR





