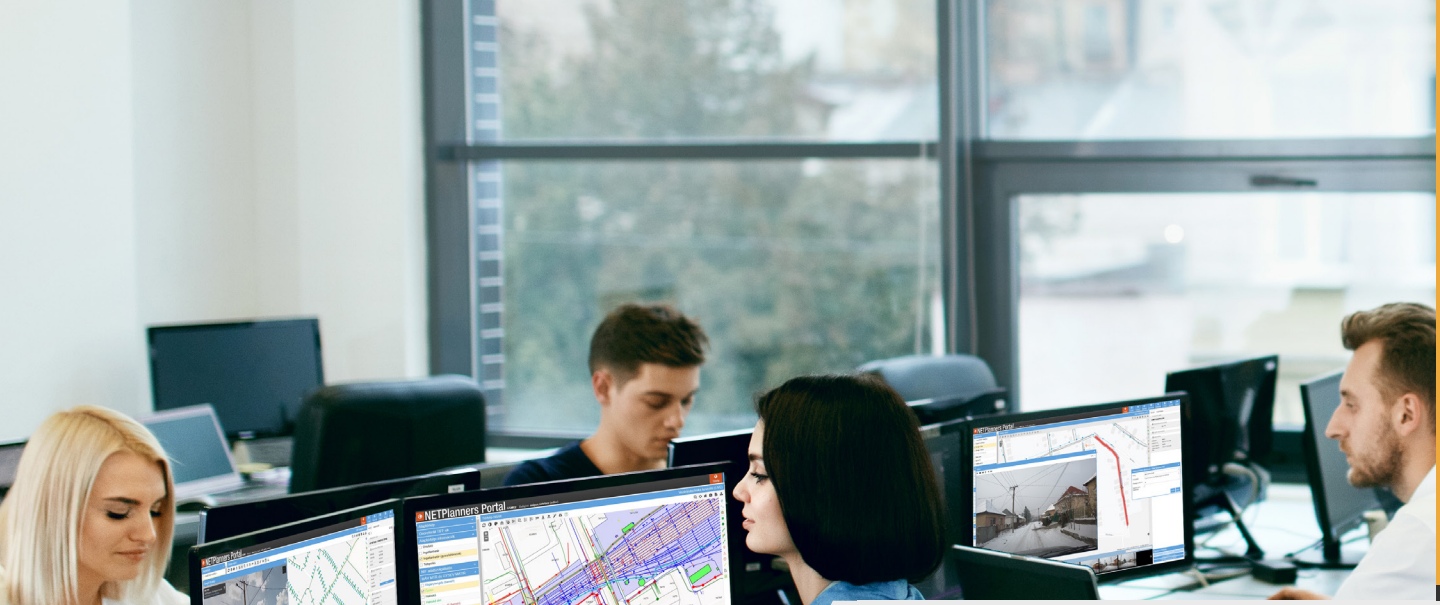


Netvisor

Smart Strategic Planner

Automatic and Optimized Planning of Access and Transport Networks

AUTOMATIC AND OPTIMIZED PLANNING OF ACCESS AND TRANSPORT NETWORKS

Smart Strategic Planner

FOR TELECOMMUNICATION PROVIDERS AND INVESTORS

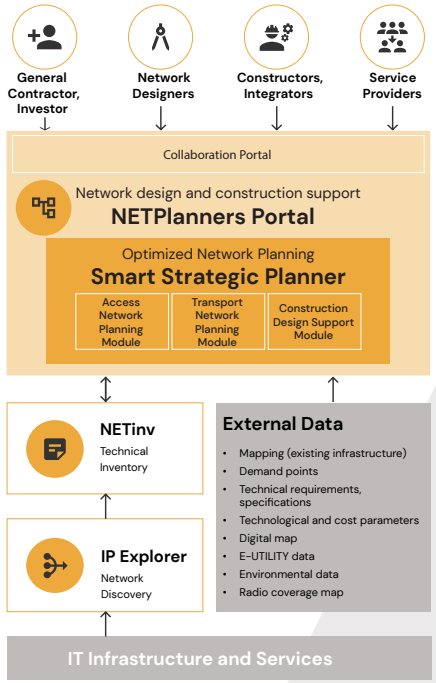
NETvisor's Smart Strategic Planner product (SSP) is a geospatial-based optimized automatic network planning and cost analysis tool that provides support in preliminary business analysis of planned broadband network investments, in making technological economic decisions and in construction or implementation planning. SSP provides detailed BOM (Bill of Materials) information and a High-Level Design, which serves as input to the Low-Level Design.

Automatic and optimized design

Our product provides automatic planning of access and transport networks. Compared to traditional design, this guarantees much more optimal results from both technical and cost points of view, fast – by designing networks with thousands of endpoints in minutes, and by producing fiber-level technology-specific design alternatives. Automatic planning has been implemented for **GPON, VDSL, HFC, AETH, P2P, DWDM, IP and 5G fronthaul technologies**.

Smart Strategic Planner has two main modules. **SSP for NGA** is used to design next-generation access networks, and **SSP for Transport** is a tool for designing transport (aggregation and backbone) networks. With the help of SSP for NGA, the optimal FTTx architecture of large-scale networks can be determined, and decision-makers can choose the most cost-effective solution among various topological and technological alternatives. SSP for Transport is a multi-level network planning system based on a general network description model, using different network optimization and evaluation algorithms, and easily adapted to specific tasks.

Smart Strategic Planner (SSP) is fully integrated into **NETPlanners Portal**, where a user-friendly interface supports all phases of network planning and deployment.



SSP for NGA for Planning Next Generation Access Networks (NGA)

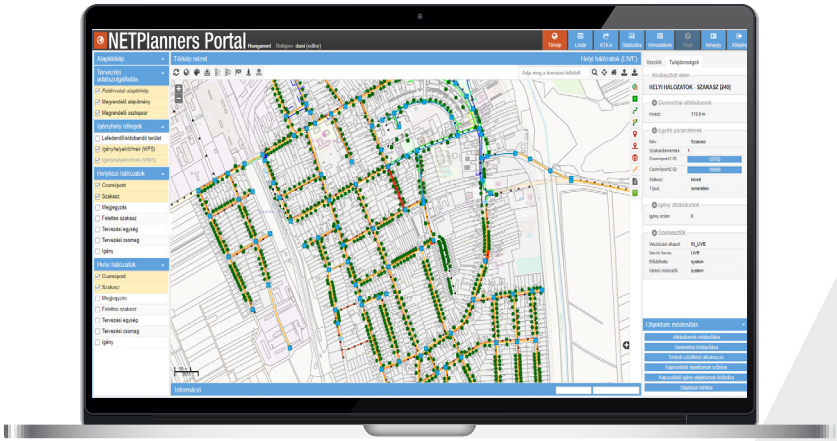
NETvisor's **SSP for NGA** product closes the gap between planning and implementing FTTx networks. SSP for NGA is a cost-conscious solution that supports strategic decisions prior to the installation of FTTx networks.

SSP for NGA is highly customizable to comply with numerous network topology standards and regulations, as well as to accommodate sophisticated pricing models. The built-in optimization engine currently **supports GPON, VDSL, HFC, AETH, P2P access network technologies** with high performance and accuracy. The offered user programming interface (API) enables the support of additional systems (e.g. external optimization engines).

The framework collects the necessary information for the optimization engine from the available geospatial data and displays the proposed network plan. **Detailed construction and installation costs are immediately available with each design version**, such as the extent of trenching, placement of tools and cables. These data help in making technological and economic decisions.

The obtained results can be automatically converted into the corresponding GIS database objects. This saves a huge amount of detailed engineering design work and **also creates a network inventory.** The strategic plan contains all the details down to the cabling level, including the configuration of the cable joints.

The **SSP for NGA** FTTx strategic network planner has a built-in reporting module, which, in addition to the detailed visual display, **also summarizes the optimization results in tabular form**. The reports can be used to evaluate the current optimization results and compare them with other solutions. Because these reports have a common format, they support technology and price comparisons and decision-making between equipment sets from different manufacturers.



SSP for NGA

SSP for Transport for Planning Transport Networks

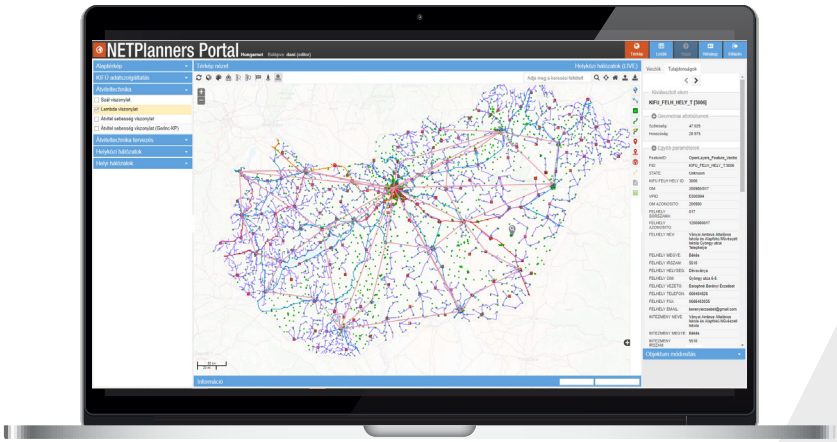
SSP for Transport is a multi-layer network planning system that **can be easily adapted to the given task**, is based on a general network descriptive model, and is supported by various network optimization and evaluation algorithms.

SSP for Transport provides a generic network layer model and node architecture model for accurate modeling and algorithm-based design of various network infrastructures. The various network layers (track, cable, fiber, lambda, IP link) and node objects (manhole, cable join, fiber join, building, frame, equipment, port) are recorded in a GIS model based on the standardized network description, which **enables algorithm-supported efficient network planning, the development of several design versions and their rapid technical and economic evaluation.**

Design algorithms allow one or two-way demand routing in any network layers on network links with limited or unlimited capacity. SSP for Transport **can provide fault-tolerant demand routing** by managing multiple network layers together and specifying different network prerequisites. In this way, in the event of a failure of any network component (SRLG), **it is able to ensure the necessary availability at the transmission technology level** and highlight problem areas arising from the topological structure. The algorithm package is of particular importance when designing networks facing high availability requirements (e.g., GSMR), where it is always necessary to prevent the effect of any single component failure.

The **SSP for Transport** planning methodology **supports bottom-up planning**, during which it determines the demand routing of cables/optical fibers/IP links/bandwidth, taking into account the given planning concepts. In the case of **top-down planning**, the IP/DWDM links and their characteristics, as well as the corresponding optimal fiber and cable routing, are determined by considering only a few preliminary restrictions (possible racks and equipment locations) to ensure the transport requirements between the nodes.

The evaluation of the network planning results is supported by the determination of CAPEX, DTR (Down Time Ratio), vulnerability, network device capacities (DWDM, IP), cable types and lengths, and utilization rates.



SSP for Transport

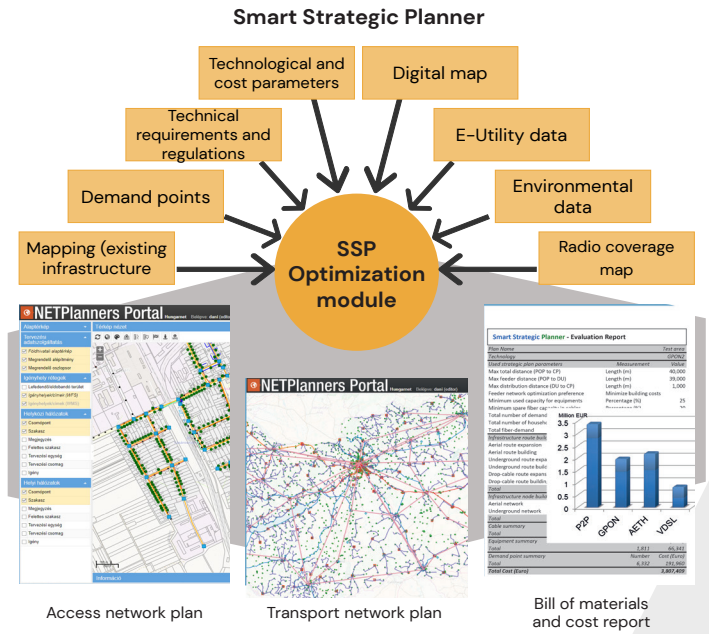
Key Features of Smart Strategic Planner

SSP ACCELERATES THE DESIGN AND CONSTRUCTION OF ACCESS AND TRANSPORT NETWORKS

- The exact installation costs of a given region's network can be determined quickly and cost-effectively.
- SSP supports engineers in finding the optimal network design strategy.
- Detailed GIS-based plans and cost calculations (BOM: bill of materials and CAPEX report) can be used immediately for both equipment and construction procurement and overall installation project management.
- The portal supports efficient work with automated data cleaning and manual editability, whether we are doing strategic level planning or construction planning.
- For designers, manual intervention is provided at any point in the design.
- Thanks to its flexible structure, SSP can also support future technologies, regional regulations and manufacturer-specific requirements.
- From the plans to the final documentation, the data is stored in a geospatial database containing the attributes of the objects, which enables querying, processing and display according to needs.

INPUT DATA OF THE OPTIMIZATION PROCEDURE

- Mapping (existing infrastructure)
- Demand points
- Technical requirements, specifications and regulations
- Technological and cost parameters
- Digital map
- E-Utility data
- Environmental data
- Radio coverage map

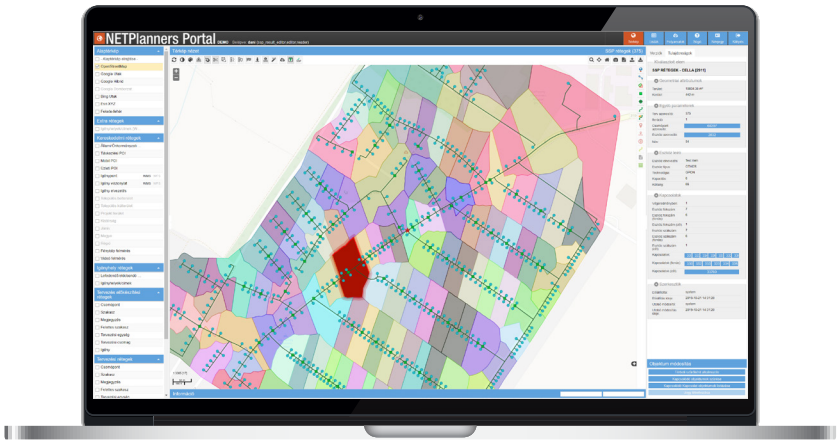


Access network plan | Transport network plan | Bill of materials and cost report

Key Features of Smart Strategic Planner

Results of the optimization procedure of Access (NGA) Networks

- Detailed calculation of investment costs (including labor and material costs).
- Access service points are automatically grouped into cells that are served by a distribution unit (e.g. splitter).
- Placement of serving structures, e.g. manholes and distribution units. The server structure is associated with the corresponding cell object.
- Plan of backbone and distribution network routes connecting the new server structure to the existing network.
- All cables and routing plans.
- Determination of cable branching and fiber splitting points.



Results of the optimization procedure of Transport Networks

- Capacity and route plan of the optical cable network
- Assignment of equipment and equipment ports to optical fibers, fiber routing plan
- DWDM link plan
- Bandwidth demand routing plan fulfilling service availability requirements
- Determination of cable fiber and transmission device capacities
- Determination of service outage times (DTR).
- Link, equipment, port, cable, optical fiber, route vulnerability tests, calculated vulnerability and utilization per section.
- Traceability of planning and implementation in space and time, monitoring
- Collaboration based on standardized data exchange between different specialist areas (logical (traffic) network design, cable network design, mobile cell design, transport network planning)
- Homogeneous, generic data structure allowing migration to GIS-based inventories.

Smart Strategic Planner

is fully integrated into [NETPlanners Portal](), and through its user-friendly collaboration portal, participants perform all phases of network planning and deployment.

1 AUTOMATICALLY DESIGN

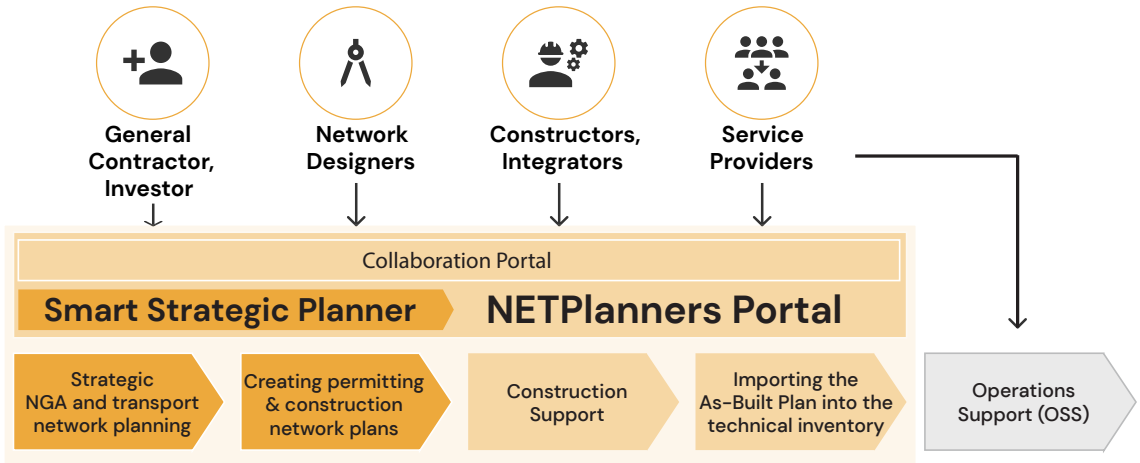
ACCESS AND TRANSPORT NETWORKS – FOR NETWORKS WITH THOUSANDS OF ENDPOINTS – IN MINUTES.

2 PREPARE PLAN ALTERNATIVES

FOR NETWORK ARCHITECTURE AND EXACT DEPLOYMENT COSTS FOR A REGION SERVING TENS OF THOUSANDS OF USERS.

3 CHOOSE THE OPTIMAL SOLUTION

FROM AMONG THE MANY TOPOLOGICAL AND TECHNOLOGICAL VERSIONS, TAKING TECHNICAL AND COST ASPECTS INTO ACCOUNT.



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