



IT-SIMPLICITY SOLUTIONS BV

ITS-NetDesign™
Our FTTH / FTTX network design & planning software for Autocad® is an important member of our suite of Optical fibre network solutions & planning tools.

Simply: design, engineer & plan
Fibre optic FTTH / FTTX networks.
Including:
Advanced modelling of P2P &
GPON Fibre optic networks.

Real network design & engineering software for Autocad®.
Faster and more flexible than any GIS.

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FTTH / FTTX network design



CONTENT

- Introduction network design
- Installation
- Engine, Settings, Calculations
- P2P & GPON optimization
- Customization
- The FTTH Software Suite

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Introduction



ITS-NetDesign is AutoCAD® based. The software is made to create all required Fibre optic FTTH / FTTX conceptual and detailed network designs and to report all related material & installation quantities per concept, job/work-order, per area, per project.

Projects.

The Fibre optic FTTH / FTTX network design software was originally made by and used internally by: NKF (Nokia / Philips) / Draka (Prysmian Group) and their project offices with local staff. Demands: simple to use software to: design (with Autocad), engineer, plan, build and complete turn-key OSP Telecommunication projects.

History.

In 1994 a first version of the network design software was implemented in project offices in Sri-Lanka & Zimbabwe for the creation of: line-demand forecast, fundamental -and detailed network designs for large Telecom Copper networks. Since then the software has been renewed every year and has been used intensively in several countries in: Africa, Asia, Europe, The Middle-East & The Caribbean for more than 2 million connections in Copper & Optical fibre networks.

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Introduction



ITS-NetDesign usage: countries / projects. Multiple projects per country mostly.
Designed & Built: more than 2 million connections in Telecom networks.

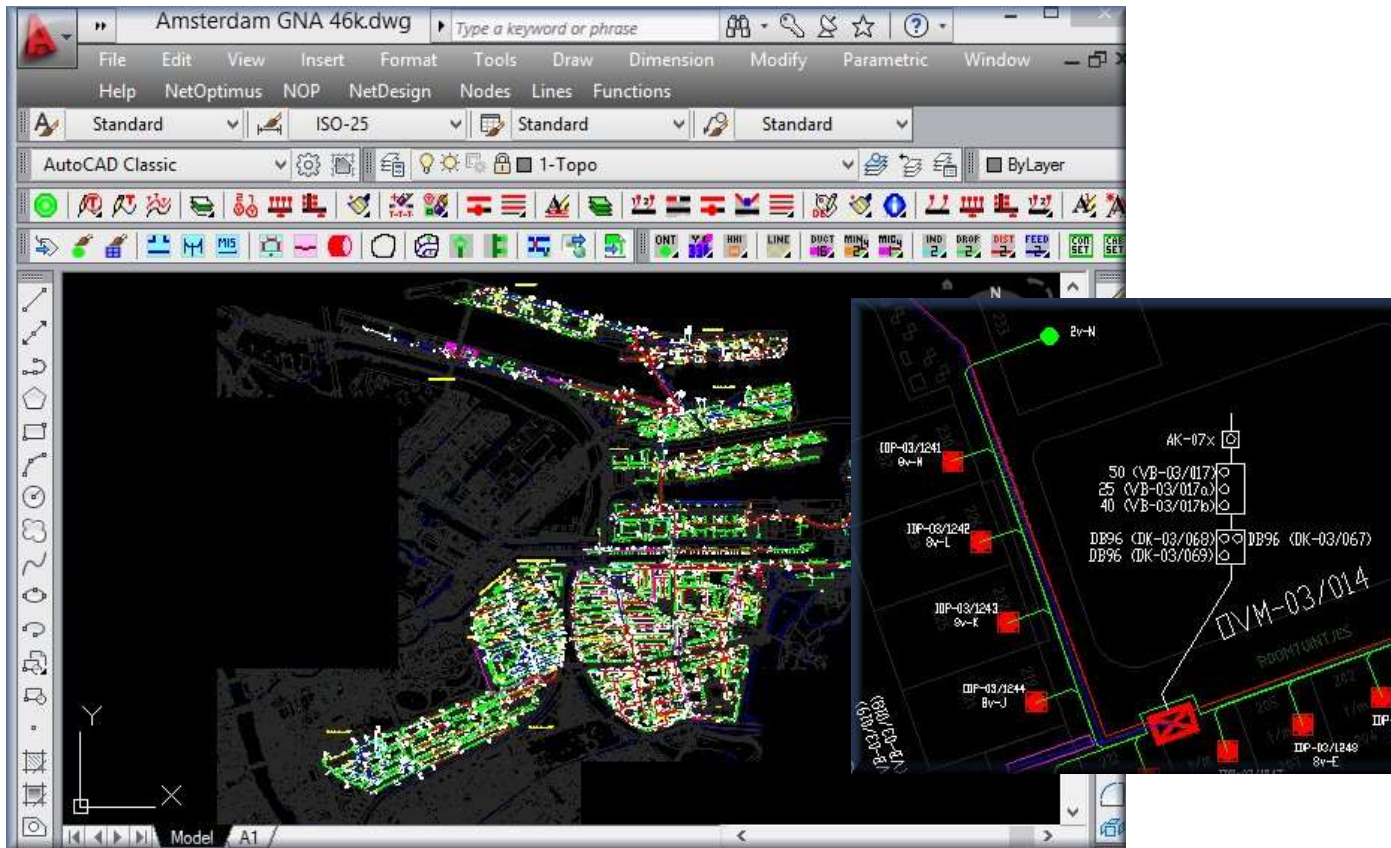


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Introduction



ITS-NetDesign usage: Amsterdam (The Netherlands)



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Introduction



ITS-NetDesign adds Fibre optic FTTH / FTTX network design / engineering functions and items to standard Autocad® (full version).

ITS-NetDesign supports:

- Manual design and modification of network items
- (Semi-) automatic network design and network modelling
- Fully-automatic cost optimized network design

(see also our website for the ITS-NetOptimus planning & optimization software)

Easy manipulation of the network design with:

- Menu's, toolbars with FTTH network items
- Data-editor: easy text and quantities dialog screen
- Easy switch from Draft / Imported data to a real network design

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Introduction



ITS-NetDesign has a powerful array of fast, easy-to-use functions:

- Manipulate and modify a design with the 'Data-painter'
- Insert and access materials and labour data with the 'Data-editor'
- Create dynamic text, labelling and duct colouring
- Automatic cable route design and trace functions
- Create customized reports for material and labour requirements per activity and area
- Create a temporary / draft design with 'Temporary-items'
- Modify a quick, temporary design, use the network menu and change the whole drawing, automatically adding project activities, jobs, symbols, colours, layers, text, materials and labour requirements, and drawing layout

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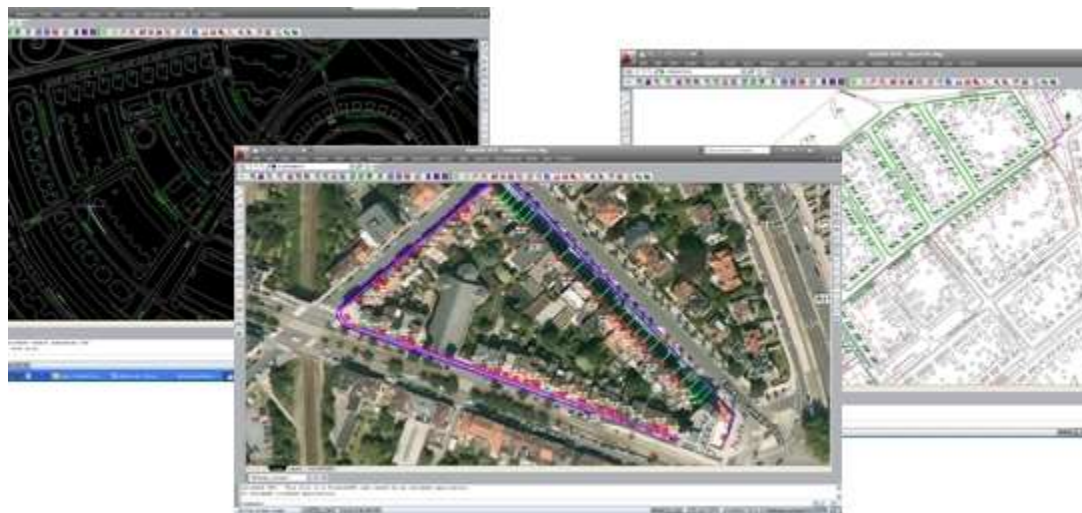
Introduction



ITS-NetDesign supports various drawing background formats:

- Import multiple customer locations, cadastral Geo data. ITS-NetDesign can use a satellite image, aerial photograph or scanned background drawings to make a quick estimate of the cost of FTTH network materials and labour.
- Various common formats can be imported as external references or underlays.

Picture: FTTH network design , cadastral design, area photo, network design



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Installation



The ITS-NetDesign software is easy to install as add-on to Autocad® (full version).

The encrypted **Engine files** of the software with the LISP programming produce all calculations and automations. (Auto) LISP is a very flexible, powerful, high-level programming language that is well suited for graphic applications.

The **Customizable** project / network type / customer related **files** with: all types of network items (cables, ducts, hand-holes, etc.), colouring & labelling functions are ASCII / text files which can be customized easily, new types can be added by text copy & paste and made visible in the Autocad menu and toolbars.

The software is installed with:

- ITS-NetDesign's design & calculation functions
- Fibre optic FTTH / FTTX network menu & toolbar with cables, ducts, civil works
- The Fibre optic FTTH / FTTX symbol (*.dwg) library

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The Engine



The Engine:

Multiple users, large projects:

- Unique ID code generator
- Automatic: **Jobs / work-orders** creation (layers & quantities per area / activity)
- Drawings contain all **Extended data**. (No links to an external database)
- Unlimited amount of concurrent designers / engineers
- No project size limits

Automatic and customizable (multiple settings) creation of: .

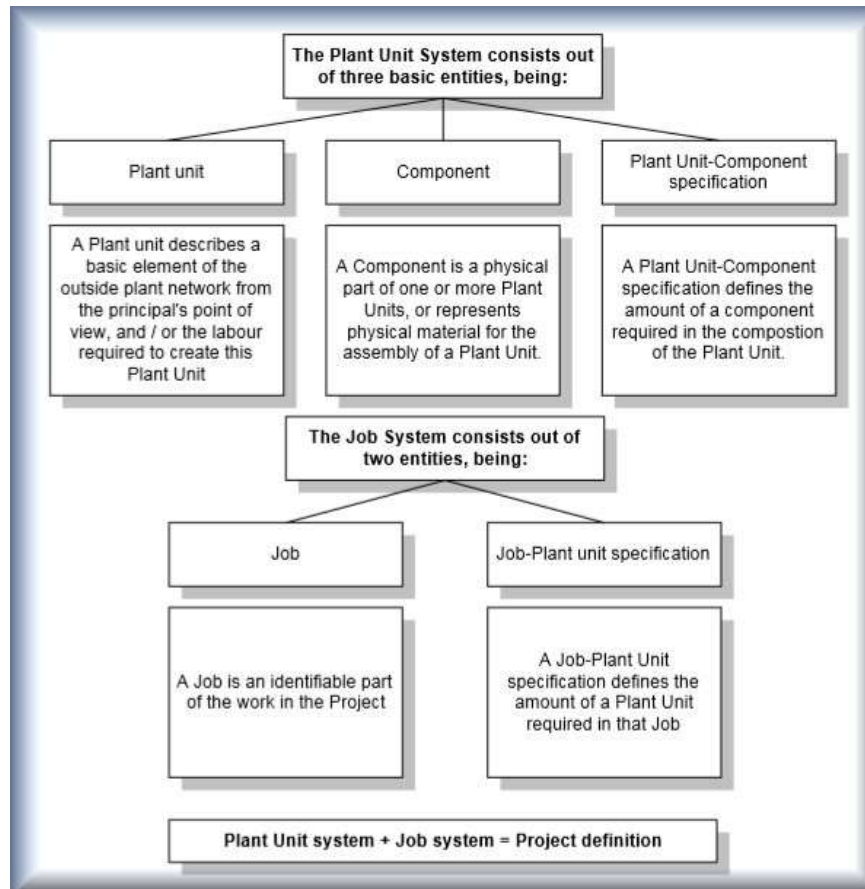
- Layers
- Fibre optic network items (cables, ducts, trenches, manipulation-points etc.)
- Labelling and colouring
- Dynamic text (address, colouring, length and quantities related)
- Material & Installations items and quantities
- Dynamic quantities (**Standard functions** and **Complex calculations** related)

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The Engine



Jobs / work-orders, definitions::



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Extended data



Extended data:

ITS-NetDesign is using the Autocad® extended data, free data space, per entity.
More than 300 unique variables / extended values are added per entity.

Extended data includes:

- Unique ID code
- Jobs / work-order code
- Fibre optic network entity relations, relative network position
- Address information, numbering, labelling, colouring, dynamic text options
- Fibre optic material & installation codes, quantities
- P2P & GPON, bandwidth's, active/passive fibres, splitter types & quantities
- Dynamic calculation options

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Extended data



Extended Fibre optic FTTH / FTTX data:

All variables are created and **calculated automatically**. Because of their very small data usage this has very little / no impact on the design speed and file size.

Since there are no links to external databases and all variables are stored within all Autocad entities (network items):

- The **drawing itself contains all information** including the extended data.
- Deleting an item is deleting the extended data, material & installation quantities...
- Copying an item is creating another unique item with similar extended data
- Modifying an item (trim, extend, stretch etc.) is modifying the extended data

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Design functions



Standard Fibre optic FTTH / FTTX design functions, summary:

- Select a cable\duct\trail\trench type from the list and start drawing
- Select a network item / manipulation-point from the list and insert it in the drawing
- Insert multiple network item series with incremental numbering
- **Import & export geo data** (building locations, addresses, trail / trench positions....)
- Use detailed CAD cadastral underground drawings or satellite images
- Use the **Data-painter** and change the imported data into network items with extended data or modify multiple similar network items
- Use one of the other special Paint functions to paste a certain (Dynamic) Text format, or **Material & Installation** values, to the selected similar items
- Use the **Trace** function and re-use (imported / existing) line information, than draw/break/trim/join traced lines to create the required trail / trench lines

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Design functions



Standard Fibre optic FTTH / FTTX design functions, summary:

- Modify the **automatically made visible dynamic text**, per item, per trench



- Create BOQ / BOM / quantity report files per: drawing, area, job / work-order

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Design functions



Standard Fibre optic FTTH / FTTX design functions, summary:

- Modify the extended data, numbering, labelling, colouring, text, quantities etc. per individual item with the Data-editor

Picture: the Data-Editor dialog

Net Project	Plant Unit	# of	Quantity x Parameter-NetProject quantity
Plant Unit-01	ODP	1	Quantity-01: 1.000 * = 1.000
Plant Unit-02	Custom Distribution Plant	1	Quantity-02: 72.000 * = 72.000
Plant Unit-03	SPLICE	1	Quantity-03: 81.000 * = 81.000
Plant Unit-04	SPUTTER-1.2	1	Quantity-04: * = *
Plant Unit-05	SPUTTER-1.4	1	Quantity-05: * = *
Plant Unit-06	SPUTTER-1.8	1	Quantity-06: 9.000 * = 9.000
Plant Unit-07	SPUTTER-1.16	1	Quantity-07: * = *
Plant Unit-08	SPUTTER-1.32	1	Quantity-08: * = *
Plant Unit-09	SPUTTER-1.54	1	Quantity-09: * = *
Plant Unit-10	SPUTTER-1.126	1	Quantity-10: * = *

At the bottom of the dialog, there are fields for 'PU-11: CASSETTE-12', 'PU-12: GROMMET-8', 'PU-13: ', and 'PU-14: CABLE', each with a 'Quan' field and a 'Cancel' button.

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Connection functions



Standard Fibre optic FTTH / FTTX connection functions, summary:

- Dropline: creates the drop / garden lines from a single street-line to the FTU's (ONT) / MDU's (MNT) symbols with a certain Chamfer (beveled edge)
- Autodrop: creates all drop / garden lines for all FTU's / MDU's for a whole area
- StreetConnect: creates the cable connections from the FTU's / MDU's to a manipulation-point using a single street-line
- Branchconnect: creates the cable connections from the FTU's / MDU's to a manipulation-point using multiple street-lines
- Aerialdrop: creates the aerial drop lines from a single DP on pole.
- LineAerialdrop: creates the aerial drop lines from a single DP via lines and a pole

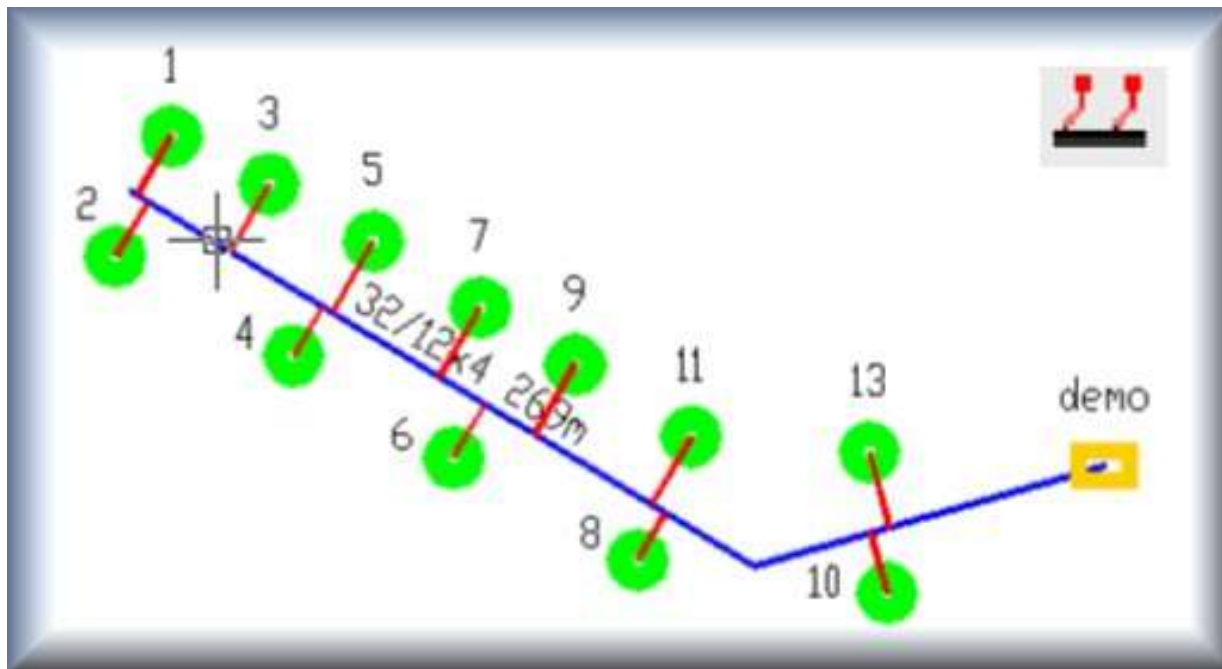
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Connection functions



Standard Fibre optic FTTH / FTTX connection functions, dropline:

- Dropline: creates the drop / garden lines from a single street-line to the FTU's (ONT) / MDU's (MNT) symbols with / without a certain Chamfer (beveled edge)



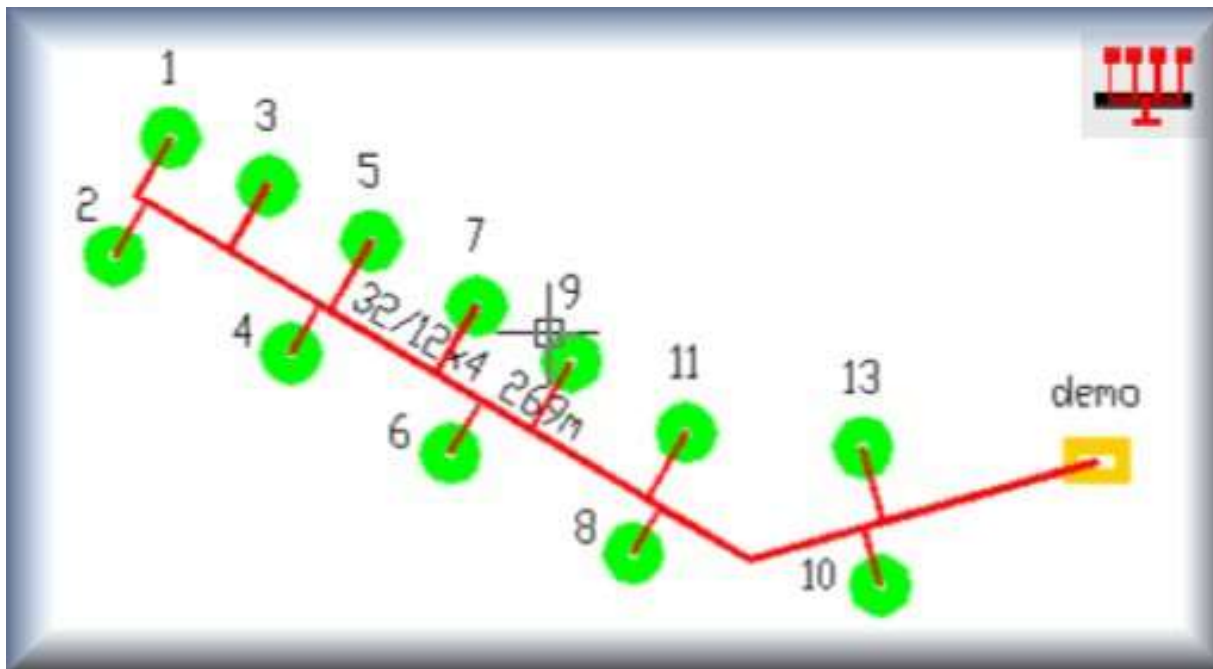
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Connection functions



Standard Fibre optic FTTH / FTTX connection functions, streetconnect:

- StreetConnect: creates the cable connections from the FTU's / MDU's to a manipulation-point within a certain street



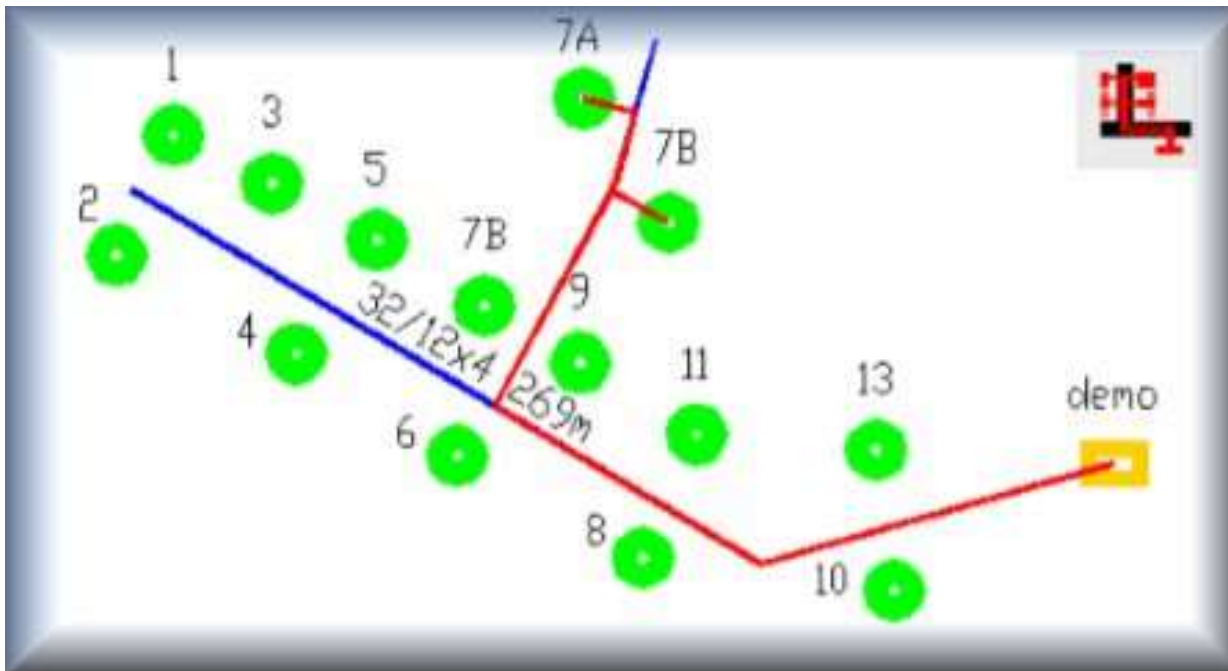
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Connection functions



Standard Fibre optic FTTH / FTTX connection functions, branchconnect:

- Branchconnect: creates the cable connections from the FTU's / MDU's to a manipulation-point for multiple streets



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Connection functions



Standard Fibre optic FTTH / FTTX connection functions, summary:

- Movetofacade: moves all FTU & MDU symbols to the building façade and create the drop / garden lines from the façade to the nearest main trench / trail.
- Split: checks and corrects all trench / trail LWPolylines at connections, drops, branches, crossings etc. and then transforms the LWPolylines into line-segments for optimization and as-built purposes

Picture: P2P & GPON network design toolbar \ Autocad ribbon



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Complex calculations



Complex Fibre optic FTTH / FTTX calculations, settings:

Clear dialog screens are used to set:

- Network concept selection: P2P / GPON
- Number of Active & Passive fibres per subscriber / FTU (ONT)
- Possible bandwidth's
- The required bandwidth, split-ratio per subscriber / FTU (ONT)
- The number of apartments per apartment-building / MDU (MNT)
- Fibre spares per manipulation-point type
- Possible cable-types, preferred fibre counts
- Cable connection rates per network / cable level
- Possible splitter-types per manipulation-point type

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Complex calculations



Complex Fibre optic FTTH / FTTX calculations, settings:

Clear dialog screens are used to set:

- Splitter threshold / minimum lines, per splitter-type
- Cassette default capacity
- Grommet default capacity
- FTU (ONT) / MDU (MNT) preference for first splitter-type to attach

Picture: splitter ratio preferences

The screenshot shows a dialog box titled "Splitter ratio preferences" with a close button (X) in the top right corner. It contains two rows of settings:

ONT/MNT customer(s) splitratio demand (1 : X)	64	Demand
ONT/MNT, splitter ratio preference (1 x X) [blank is automatic]	8	Splitter

At the bottom of the dialog box are two buttons: "OK" and "Cancel".

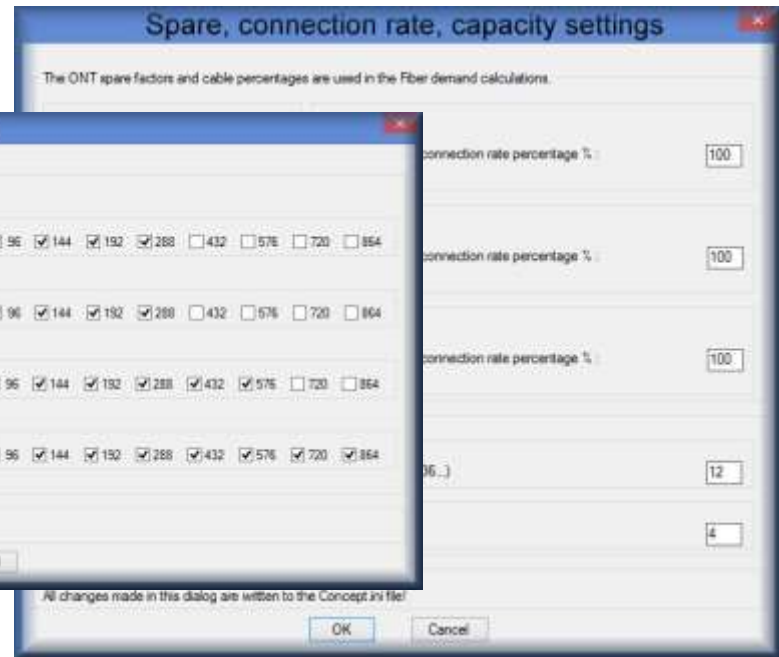
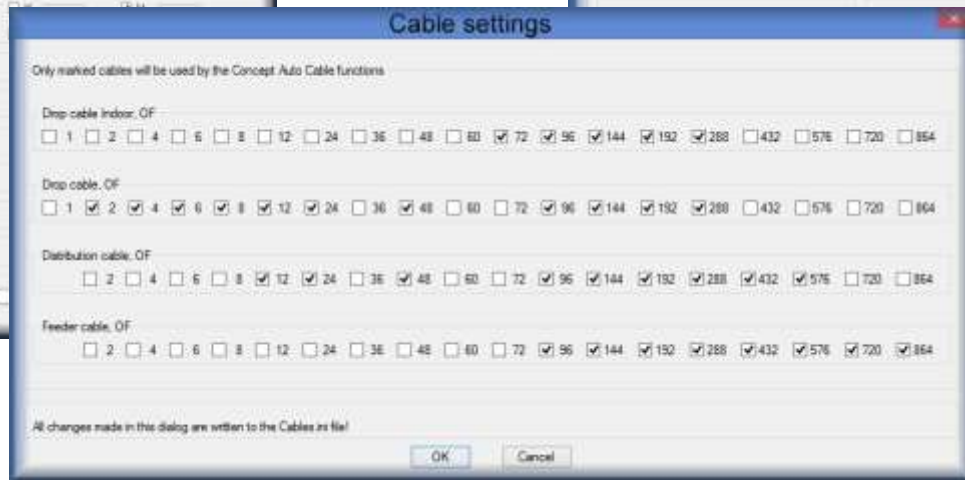
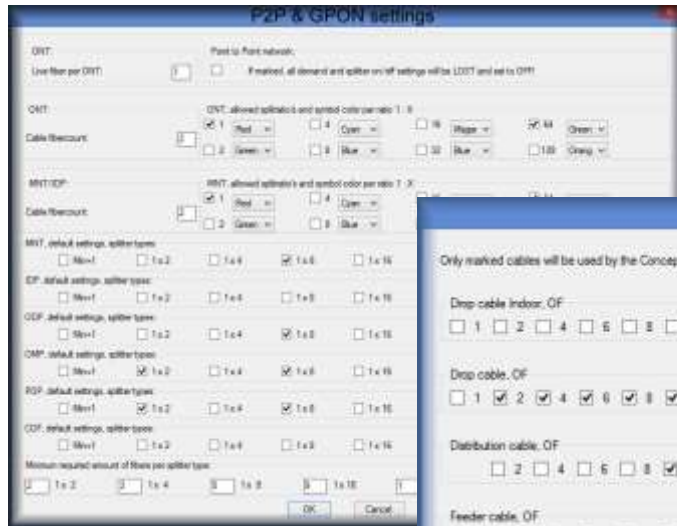
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Complex calculations



Complex Fibre optic FTTH / FTTX calculations, settings:

Pictures: P2P & GPON settings: splitter calculation, cable, spares



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Complex calculations



Complex Fibre optic FTTH / FTTX calculations, summary:

Summary of a number of more complex calculation functions:

- The Data-editor: calculates all dynamic quantities and dynamic text
- Auto-cable: calculates fibres requirements and creates all required cables
- Auto-labelling: creates the customizable cable labelling
- Manual-calculation: per single manipulation-point, checks all connections, calculates all material & installation requirements, amount of connected customer-connection / FTU (ONT), passive fibres amount, active fibre requirements per bandwidth, splitter-types and quantities
- **'Spider-calculation'**: with a single click, enforcing all **P2P / GPON** settings, the whole network is re-calculated & re-designed. The dynamic text / labelling will automatically show: splitter-types and quantities per manipulation-point
- Concept area info: shows all quantities of connections, cable & trench types

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P2P / GPON, summary



Fibre optic FTTH / FTTX P2P / GPON, summary:

The ITS-NetDesign software is capable of searching for all 'down' nodes and can determine the number of fibres required in the cables to the nodes.

In addition, the software calculates the number of splices, splice cassettes and cable inlet grommets for the selected nodes. In PON networks, it also calculates the number and type of optical splitters required with a single click. If needed, splices, cassettes and splitters can be assigned to capacity limits, with warnings indicating if the limits have been exceeded.

With ITS-NetDesign it is possible to perform 'Spider Calculations' on all 'down' nodes, or 'select all' and **let the program calculate** and decide for the whole network.

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P2P / GPON, summary



Fibre optic FTTH / FTTX P2P / GPON, pictures:

Picture: P2P / GPON dialog screen, splitter calculations, optical fibres / bandwidth quantities for a certain manipulation point



Picture:
DP with (72) FTU's (ONT) connected
144 cable fibres (72 x 2 OF) down
72 live fibres down
9 x 1:8 splitter
9 live fibres up



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P2P / GPON, summary



Fibre optic FTTH / FTTX P2P / GPON, summary:

Through a mix of automation, smart interpretation, pure speed and ease of use the P2P / GPON modelling functions enable network designers to calculate and **re-calculate and compare an unlimited number of concepts and iterations.**

It calculates the **best splitter types** to employ and the best places to **locate** them in the network.

In addition, it helps designers choose the most appropriate cables and wiring configurations to **minimize costs** by making quick concept comparisons per area.

Picture: P2P & GPON network design concepts toolbar, Autocad



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Customization



Customization, standard:

Customer related LISP files : ASCII / text files which can be customized easily, new types can be added by text copy & paste and made visible in the Autocad menu and toolbars. Customizable:

- Layers
- Network items (cables, ducts, trenches, manipulation-points etc.)
- Labelling and colouring
- Dynamic text (address, colouring, length and quantities related)
- Material & Installations items and quantities
- Dynamic quantities (Standard functions and Complex calculations related)

Customization, more complex:

More complex, special calculation and representation, functions and toolbars are tailor made by us or with our help.

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Customization

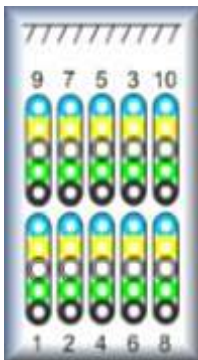


Customization, example:

FTTH, Germany.

Microtrenching with different types of Flatliners, microducts.

Customizations: automatic cross-section creator, shows: each individual flatliner position within the micro-trench, micro-duct occupied Y/N, minimal microtrench cutter width. The end of each individual flatliner is automatically marked in the drawing and shows in the not-used microducts. The FTU (ONT) / MDU (MNT) is (microduct) colour marked. Per DP (KVz) text is shown with: label, DP number, number of buildings, number of FTU's (WE) and fibre count (Fs).



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Customization

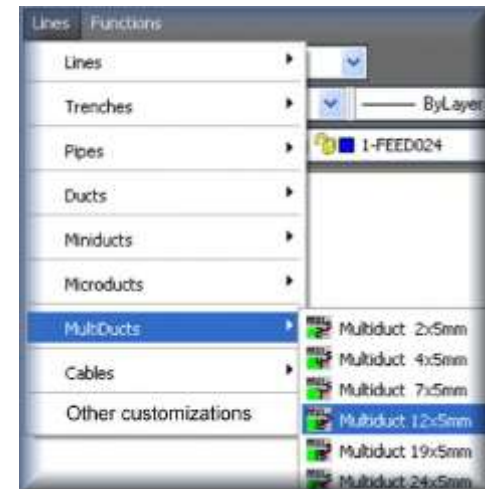


Customization example:

FTTH, Amsterdam, The Netherlands.

Per FTU / ONT: 1 Analog fibre (TV signal via splitters) and 1 Digital fibre (P2P)
Micro-duct network for the feeder cables part and direct buried drop cables.

Customizations: coding / labelling and symbols, tailor made calculations of fibres and materials & installations, drawing menu's / layout / legenda.



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Customization



Customization, summary:

Customized Implementation:

Not all Fibre optic FTTH / FTTX networks are the same. Different network concept? Other products and installation methods? Your own labelling system for cables, connectors and other network elements? An added value to ITS-NetDesign is our Customized Implementation service. You tell us the information you need and how you want it presented, and we can tailor your FTTH software accordingly or we help you to do your own customization.

Interface Customization

The software suite has extensive possibilities to create, implement and register networks. Not all users do have needs to view and modify all the information, Some users want to add other, not network related, information to the common database. Other users want tot have a quick and comprehensive access to only a limited set of information out of the database. For these customers our software team can develop additional Customized Interface to fulfil their requirements

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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, summary:

Fibre optic FTTH / FTTX ITS-Software Suite™

Is a **proven software solution** to Design, Build & Maintain Fibre optic FTTH / FTTX networks.

The ITS-Software Suite™ has designed, registered and installed **several millions** of connections.

The ITS-Software Suite™:

- **Cost optimized** automatic CAD design
- **Dedicated software** for Fibre optic FTTH / FTTX **Project-Management**
- Simple conversion from pre-registration to As-built **network registration**
- Offers **full process control** over your projects

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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, best results:

Fibre optic FTTH / FTTX ITS-Software Suite™

For the **best results**, network design should be approached from the top down and built from the bottom up.

ITSimplicity Solutions BV helps select the most appropriate technology and create a solid business case, and **provides tools** to design, build, test and maintain the network, right down to creating an accurate Bill of Materials (BoM).

Years of practical experience in turn-key **projects of all sizes**, our knowhow of best-in-class materials and installation techniques allow us to get future-proof networks up and running in no time, even when there are sudden changes in plan or customer requirements.

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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, experience:

ITSimplicity Solutions BV covers the entire path from local exchange to the doorstep. With our software tools and services, and decades of experience in deploying **cost-effective networks** around the globe, we're committed to giving you expert advice on maximising performance and minimising cost.

Relying on **over 20 years' experience** in Telecom OSP network design, ITSimplicity Solutions BV's engineering and consultancy team can help you cut the cost of planning, designing, optimising, costing and implementing a superfast broadband network. Our engineering services combine extensive knowledge and advanced software tools to design, engineer and optimise your passive optical fibre networks.

Our design and planning tools **remove the guesswork** out of material requirements, eliminating the need to redo preliminary drawings and cost calculations when a project gets the go ahead.

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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, Fibre optic FTTH / FTTX network design:

Create a detailed network design.

By automating, sequencing and simplifying components and processes, our design and planning software helps analyse and visualise scenarios easily and quickly, information needed to support financial business case scenario planning. Using site survey findings, initial estimations of BoQ, BoL and BoM can be enhanced as part of a highly detailed design (issues such as the accessibility of existing ducts and poles will then be taken into account).

Build a winning business case.

Relying on our design & engineering solutions is the quick and easy way to build a solid business case for the topology and deployment options for your network and to be certain of investing in a robust, future-proof, cost efficient, high performance network.



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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, Fibre optic FTTH / FTTX network design:

From concept to detailed design.

From concept to design, development, building and maintenance of networks for **crowded cities or rural regions**, with our integrated software solutions you have everything covered.

Our design software maps, configures, optimises and calculates costs of network concepts in seconds. Changes and variations are **easy to implement** whilst designing and even after installation. Expert engineering and consultancy services, plus professional support for building a winning business case.

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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, services / output:

Full range of services:

- Network definition, general technical business case
- Topology choice (P2P or P2MP) or a mix of legacy/new build
- Technology choice (PoN or Ethernet)
- Number of homes (Multi Dwelling Units (MDUs), single dwelling, etc.)
- Alternative Rights of Way (RoW)
- FTTH in MDUs (e.g. flats)
- Financial scenario planning based on detailed designs
- Bill of Quantities (BoQ)
- Bill of Materials (BoM)
- Bill of Labour (BoL)
- Detailed network engineering, including as-built documentation (BoQ, BoM, BoL) and:
 - Fibre, Splicing schemes
 - Duct-labelling plans
 - Connection lists for distribution points
 - Drawings for implementing and/or permitting
 - Drawings for household connections

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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, network design:

ITS-NetDesign™

Flexible solution for Fibre optic FTTH / FTTX design, based on **Autocad®**.

Automatic: costing, cabling, labelling, easy switch from P2P to GPON.

Fast output as: schematics, installer ready & as-built designs. Easy to learn.

Picture: FTTH network design Amsterdam including labelling, calculations, project management and registration



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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, project management:

ITS-NetProject™

Extensive system for: **Material, Contract and Project management.**

Lego-like structure: three project levels with 'building blocks'.

Total process control, including: purchasing, contractors, progress reports.

Completely customizable and simple to operate.

Picture: FTTH / FTTX project preparation, implementation and commissioning, project info, supplier info, datasheets

The composite image illustrates the project management process and software interface. On the left, a flowchart is divided into three stages: PREPARATION, IMPLEMENTATION, and COMMISSIONING. In the PREPARATION stage, 'JOB ISSUE - SCOPE - PLANNING' leads to 'SITE INSTRUCTIONS'. In the IMPLEMENTATION stage, 'SITE INSTRUCTIONS' leads to 'ACTUALISED JOB DEFINITION', which then leads to 'RELEASE NOTE 1' and 'RELEASE NOTE 2', each followed by a 'PROGRESS REPORT'. In the COMMISSIONING stage, 'ACTUALISED JOB DEFINITION' leads to 'AS-BUILT DATA'. On the right, a screenshot of the ITS-Software Suite interface shows a 'Project' window with a table of tasks and their completion status. The table includes columns for 'Task', 'Description', 'Release order', 'Status', and 'System'. Below the table, there are fields for 'Material' and 'Project' information. To the right of the software window is a product image of a black, ruggedized handheld device, likely a PDA or rugged smartphone used in the field.

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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, network registration:

ITS-NetID™

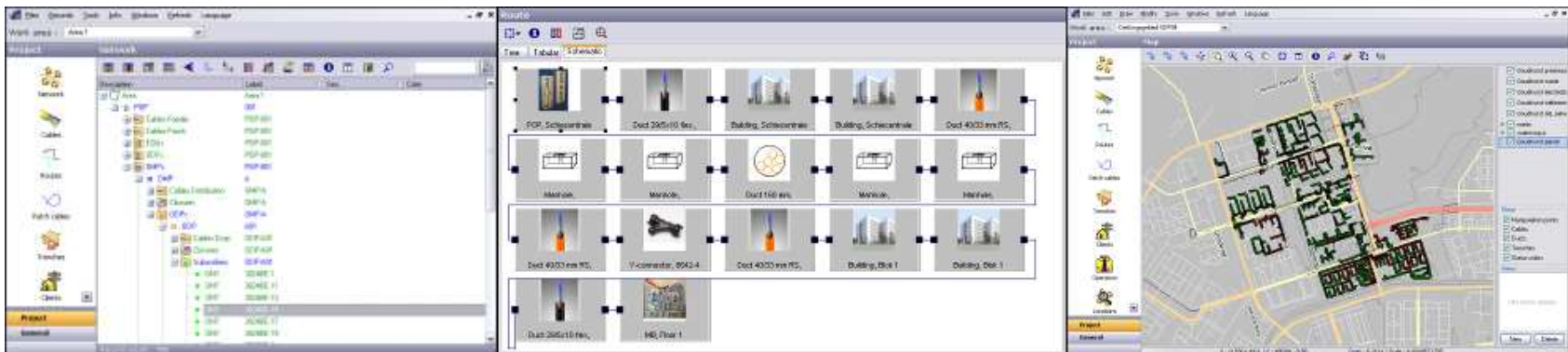
Optical fibre network registration with easy tree structure en integrated GIS.

All information directly available for multiple users.

All network details are direct available in multiple views and GIS.

Lego-like customizable building blocks. Easy to operate.

Picture: FTTH / FTTX network documentation, registration views: tree, cable route, interactive map, GIS





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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, automatic cost optimized network design:

ITS-NetOptimus™

Our **automatic network engineering, design & planning** solution.

Creates the highest quality Fibre optic FTTH / FTTX network-designs by using complex optimization algorithms within a user friendly graphical interface.

Cost optimized network designs are made in minutes instead of days.

Optimization parameters:

- Civil costs
- Material costs
- Installation costs

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FTTH / FTTX ITS-Software Suite™

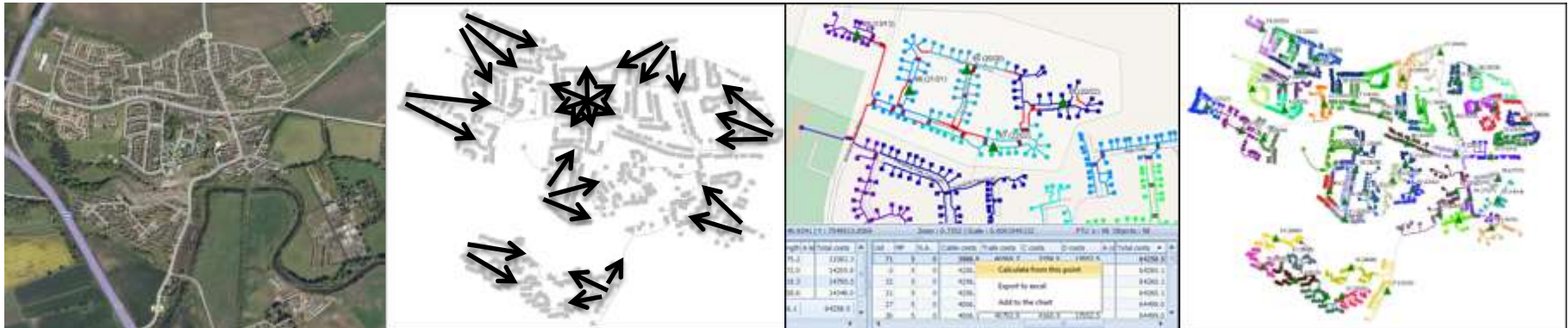


ITS-Software Suite™, automatic cost optimized network design:

ITS-NetOptimus™ offers substantial benefits in terms of **reducing the engineering time and network building costs.**

The best network designs are listed with costs and made visible within minutes

Picture: FTTH project photo, multiple calculations, alternative designs listed, best DP area's





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FTTH / FTTX ITS-Software Suite™



ITS-Software Suite™, automatic cost optimized network design:

Network designs and costs are directly available per area.

Multiple levels and network concepts.

Substantial material and installation savings (approx):

20 % less drop cable by improved grouping homes

2 % less distribution cable by best DP positioning

2% less trenching costs by improved routing

100 times faster than manual / alternative engineering



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