ITSIMPLICITY SOLUTIONS

ITS-NetDesign™:

FTTH / FTTX network design & planning software for Autocad (Map3D®)
Contents:

- Introduction network design
- Installation
- Engine, Settings, Calculations
- P2P & GPON optimisation
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- The FTTH Software Suite
ITS-NetDesign is AutoCAD® (Map3D) 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The Fibre optic FTTH / FTTX network design software was originally made by and used internally by: NKF (Nokia / Philips) / Draka (Prysmian Group) and their project offices with local staff.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
The Draka/Prysmian project & software engineering team took over all OSP software tools & solutions, rights and ownerships, from Draka / Prysmian and became an independent company called ITSimplicity Solutions BV (ITS) in February 2013. Since 1994 the software has been renewed every year and has been used intensively in several countries in: Africa, Asia, Europe, The Middle-East & The Caribbean.
ITS-NetDesign adds Fibre optic FTTH / FTTX network design / engineering functions and items to standard AutoCAD® (Map3D).

ITS-NetDesign supports:
• Manual design and modification of network items
• (Semi-) automatic network design and network modelling
• Fully-automatic cost optimised network design

(see also our website for the ITS-NetOptimus planning & optimisation 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
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 customised 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
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*
The ITS-NetDesign software is easy to install as add-on to AutoCAD® (Map3D).

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 **Customisable** 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 customised 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
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 customisable (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)
Jobs / work-orders, definitions:

The Plant Unit System consists out of three basic entities, being:

- **Plant unit**: A Plant unit describes a basic element of the outside plant network from the principal's point of view, and/or the labour required to create this Plant Unit.
- **Component**: A Component is a physical part of one or more Plant Units, or represents physical material for the assembly of a Plant Unit.
- **Plant Unit-Component specification**: A Plant Unit-Component specification defines the amount of a component required in the composition of the Plant Unit.

The Job System consists out of two entities, being:

- **Job**: A Job is an identifiable part of the work in the Project.
- **Job-Plant unit specification**: A Job-Plant Unit specification defines the amount of a Plant Unit required in that Job.

Plant Unit system + Job system = Project definition
ITS-NetDesign is using the AutoCAD® (Map3D) 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
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
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
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
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*
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.
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)
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.
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
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 LWPolylnes at connections, drops, branches, crossings etc. and than transforms the LWPolylnes into line-segments for optimisation and as-built purposes.

*Picture: P2P & GPON network design toolbar \ AutoCAD ribbon*
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
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*
Complex Fibre optic FTTH / FTTX calculations, settings:

Pictures: P2P & GPON settings: splitter calculation, cable, spares
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 customisable 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
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.
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
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 **minimise costs** by making quick concept comparisons per area.
Customisation, standard:
Customer related LISP files: ASCII / text files which can be customised easily, new types can be added by text copy & paste and made visible in the Autocad menu and toolbars. Customisable:
• 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)

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

FTTH, Germany.
Microtrenching with different types of Flatliners, microducts.

**Customisations:** 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).
Customisation 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. **Customisations**: coding / labelling and symbols, tailor made calculations of fibres and materials & installations, drawing menu’s / layout / legenda.
Customisation, summary:

**Customised 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 Customised 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 customisation.

**Interface Customisation**
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 Customised Interface to fulfil their requirements.
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 optimised** 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
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.
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 30 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.
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.
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.
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
ITS-Software Suite™, network design: ITS-NetDesign™. A flexible solution for FTTH design, based on AutoCAD® (Map3D).

Automatic: costing, cabling, labelling, easy switch from P2P to GPON. Fast output as: schematics, installer ready & as-built designs. Easy to learn.

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