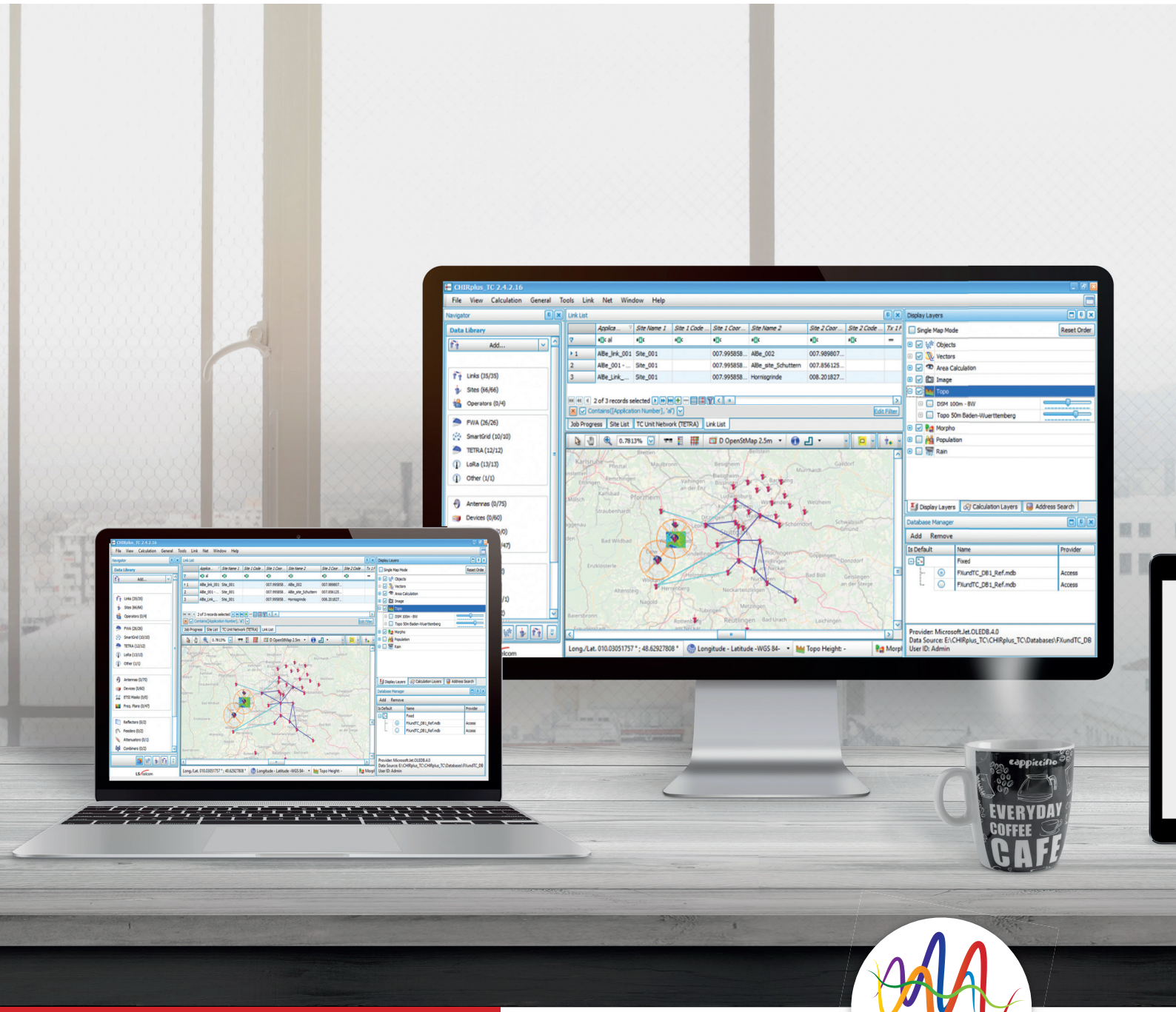
LS telcom
Smart Spectrum Solutions



Radio Network Planning

Global Spectrum Experience

CHIRplus_TC

User-friendly and efficient planning of radio networks

CHIRplus_TC

Efficient Design and Planning of Wireless Telecommunications

Wireless service providers today see their radio networks as a strategic asset which determines overall operational performance and profitability. Professional design and planning of these networks is therefore fundamental.

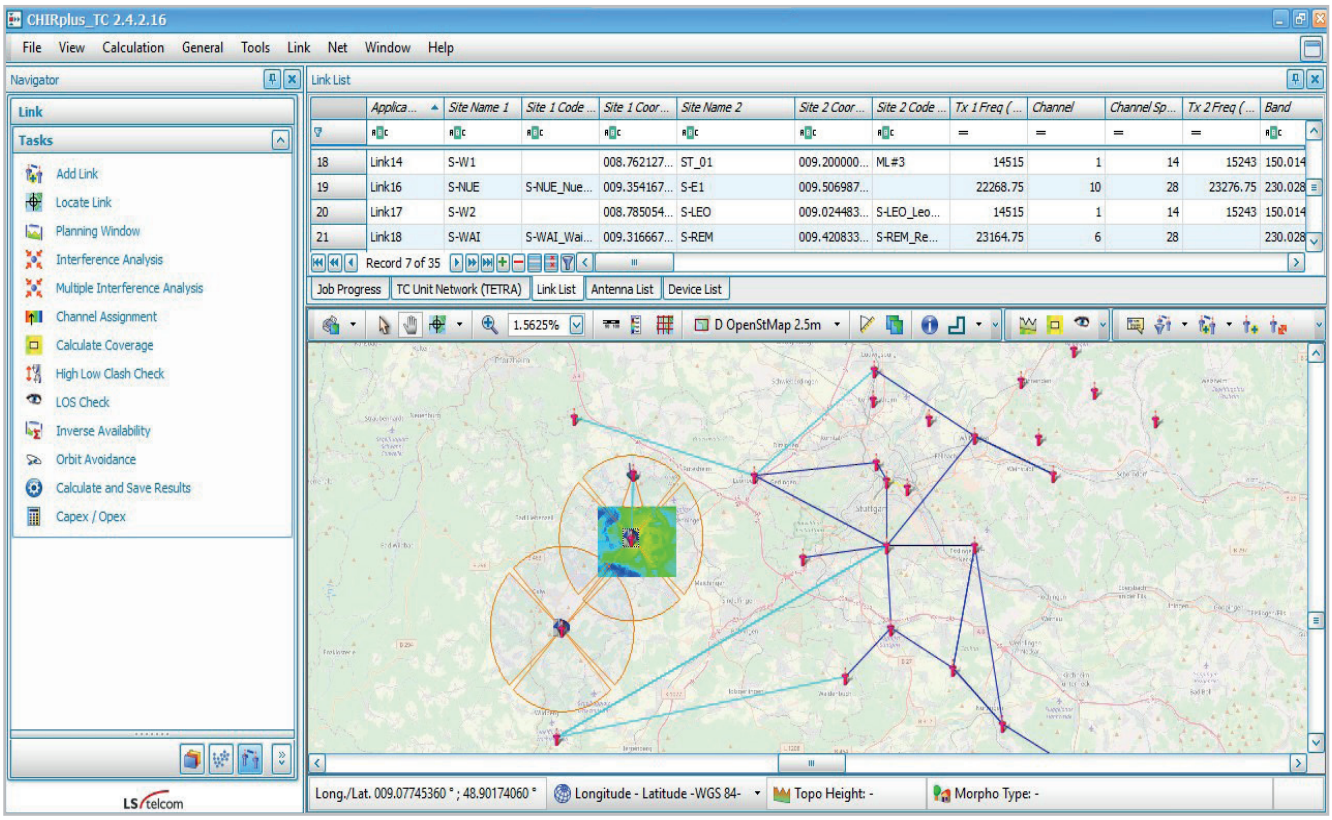
CHIRplus_TC provides comprehensive RF engineering capabilities to design and plan high performance networks. It has a modular structure and supports the analysis of point-to-point, point-to-multipoint and mobile networks. A highly intuitive graphical user interface ensures efficient and effective tool handling.

End-to-end engineering of backhaul networks including site selection, line-of-sight (LOS) analysis, detailed link engineering, channel assignment, coordination and interference analysis as well as automated generation of license applications is supported by CHIRplus_TC.

Our planning tool provides functions for the design of complete wireless networks considering mobile technologies such as mobile (4G/5G), TETRA, P25, LMR, DMR, PMR or wireless Internet of Things (IoT) technologies (e.g. LoRa). This includes powerful coverage prediction and interference assessment.

The key to fast and cost-effective network planning is operational efficiency. Radio engineers want to concentrate on their planning job and need software which is highly convenient to use. CHIRplus_TC provides great software usability, database access and database analytics.

CHIRplus_TC, based on many years of expert engineering knowledge and customer experience, is the most modern software solution in terms of architecture, technology and ease of use.



Modern Engineering

Great Usability

CHIRplus_TC provides a modern and interactive user interface which improves the user experience and allows for a faster planning process

- Synchronous data binding recalculates the results immediately upon any change of a parameter without requiring the user to save. This allows the testing of many different settings in a very short time and optimizing the results even faster
- Process optimization is reached through automation of numerous steps in the engineering processes
- Ergonomic access to functions is available with the aid of mouse gestures

Database analytics

CHIRplus_TC includes superior import and export functionalities based on industry standards including XML or XLS. This facilitates data migration processes from third party systems towards CHIRplus_TC as well as the integration into existing environments. In addition, powerful reporting and statistics capabilities are available using practice-proven report templates that are filled automatically.

Customizable query forms enable you to sort, filter and search any kind of information needed for regularreporting and the tracking of key performance indicators (KPIs).

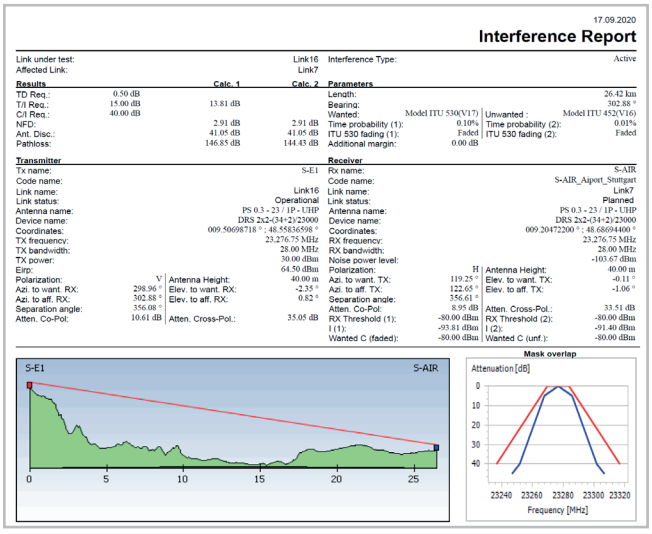
Benefit from the multi-user database access which is flexible, scalable and future-proof. Select your database, such as MS Access, MS SQL or Oracle, from a dropdown list and start planning immediately.

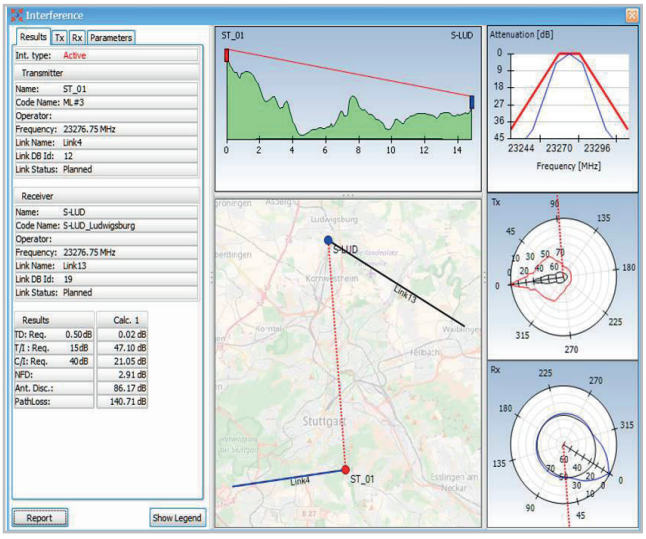
- Extensive import and export functionality
- Practice-proven set of standard reports that may be customized
- Multi-database access allows to quickly change between 'productive' and 'test' database

Modern GUI

The intuitive Graphical User Interface (GUI) guides you step-by-step through the network planning process.

- All display elements of the GUI can be customized according to your requirements.
- The instant search function in text fields helps you to select information from a long data list faster - even before you finish typing the full text.
- Better map handling and visualization
- Adjust the opacity of your maps to overlay and visualize them exactly as you want.
- Benefit from better visualization of interference results: interferer path profiles are indicated on the map as well as transmitter/receiver filters and antenna patterns.
- Make use of seamlessly integrated web mapping sources (e.g. OpenStreetMap, Bing Maps and many more).





Use Cases and Applications

5G New Radio

5G offers significant improvements over other technologies in different areas. For your individual use case you can choose between a high data throughput, low latency or coverage of a large number of devices.

CHIRplus_TC provides the necessary functions to optimize your 5G network and your individual use cases.

- **Calculations for Campus Networks**
  Calculation of LTE specific values such as RSSI, RSRP, RSRQ, SINR and cell overlapping zones allow you to determine the range and interference in the desired area in order to optimize the coverage of your campus network.

- **Display the maximum possible data rate**
  To determine the maximum throughput of your network you can calculate and display the maximum data rate between your transmitters and receivers.

- **Best Server and Number of Best Server SINR**
  Display the server with the maximum SINR value and visualize the number of servers that reach a predefined SINR threshold.

- **5G NR Throughput Calculator**
  Calculate the capacity requirements for your 5G network for a specific use case and set the parameters accordingly to achieve best results for your network.

- **5G NR Link Budget Calculator**
  Calculate the required signal strength at the receiver which is needed to provide the previously calculated capacity at the receiver. The height of the receiver, the attenuation by housing or the human body, the sensitivity of the receiver, and other factors that influence the signal strength are taken into account during the calculation. Based on the 3GPP 38.901 standard, this calculation ensures that the signal reaches the receiver.

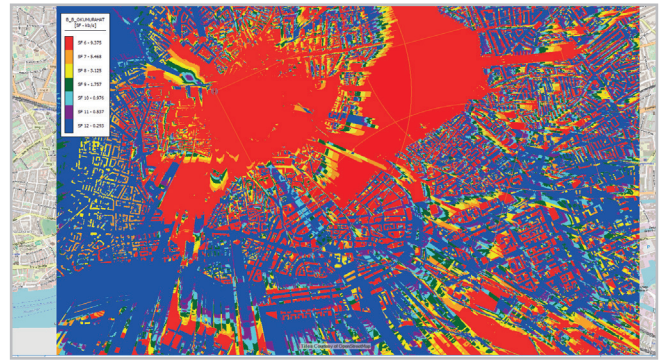
- **Wave Propagation Model ITU-R P.1411**
  Implemented standard for planning of 4G/5G networks .

Internet of Things (IoT) and Industry 4.0

IoT and Industry 4.0 will result in an increasing amount of connected devices and sensors. But we also encounter a growing number of standards in this field such as LoRa, Sigfox, NB-IoT, and many more.

With CHIRplus_TC you can perform dedicated coverage analysis to assure that IoT devices will have sufficient connection and bandwidth for the respective application. The flexible data editor for the devices is able to accommodate basically all IoT devices and antennas. The software also provides all relevant frequency plans for IoT communications.

CHIRplus_TC analyzes specific parameters such as the LoRa spreading factors and displays them graphically for a clear overview of network and connection performance. For the verification and validation of coverage predictions, measurement data can be imported and compared with the simulations.



- Ensure connection and bandwidth for your applications
- All relevant technologies and wave propagation models are provided
- Check coverage for a large number of devices by a single area analysis

Smart Meter Network

CHIRplus_TC assists the user with an advanced functionality when planning smart metering networks. Different network units can be considered, such as smart meters, transformer stations, water meters, remote inquiry and remote control units. During planning and conception, CHIRplus_TC takes into consideration all relevant technical characteristics of the units as well as the network.

- Ensure connectivity for a vast amount of devices
- Planning and analysis of smart meter networks
- Calculate coverage and received signal strength

Fixed Services

Radio networks rely on a stable and powerful backhaul network that is in many cases realized with the aid of microwave links. To provide stability and flexibility such networks require a scalable and robust infrastructure with cost-efficient construction, operation and administration.

To assist you in the design and realization of those networks, LS telcom provides the optimal solution: CHIRplus_TC offers user-friendly and efficient fixed link planning methods which are appreciated by our international customer base.

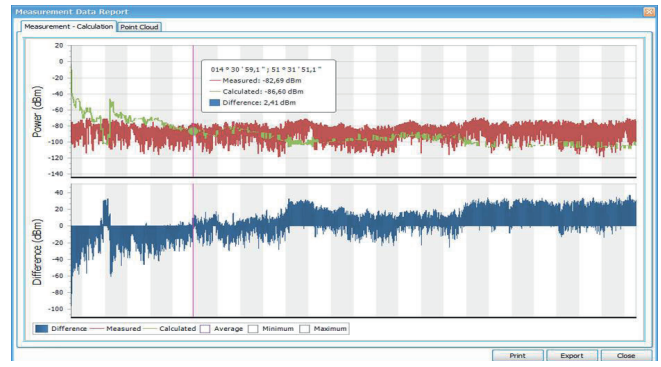
Within short time you can create and analyze new microwave links. You will benefit from comprehensive technical libraries that allow you to choose from different device and antenna data. Manual data entry, which can be time-consuming and error-prone, is thus eliminated.

A continuously updated library of wave propagation models allows calculating the following properties: Path loss, link availability, adaptive modulation, frequency/ space diversity and many more.

- Easy to plan and analyze performance and availability of all types of links
- Optimize your links by adjusting different parameters and equipment
- Link performance is recalculated immediately after any adjustment is made
- Perform cost analysis on links and networks
- Safe time and avoid errors by creating frequency application for the national regulator based on planning

Mobile Services

No matter what kind of radio service (TETRA, P25, LMR, DMR, 4G/5G, etc.) is relevant for you: CHIRplus_TC is your tool to analyze and optimize the performance of the network. The tool includes area calculations allowing you to determine which areas are covered by a base station, or by a single sector antenna. Even a whole network with many base stations and antennas can be analyzed.



In addition, a powerful population analysis enables you to determine the area as well as the population that is covered by a base station or network.

The calculation results may also be verified with the aid of measurement data. Make use of the integrated import functionality and correlate simulations with real world data.

- Analysis of all relevant technologies and radio services for networks
- Single station and network analysis
- Correlation with measurement data

State-of-the-art Technology

CHIRplus_TC is based on the latest software development technology. Innovative features and functionality are therefore added very fast. LS telcom continuously follows developments in the market. As an ITU Sector Member and member of industry bodies such as 5G ACIA we incorporate the corresponding functions directly into the tool.

Complex calculations are based on multithreading which reduces calculation time considerably. Providing a scalable solution CHIRplus_TC allows analyzing small and large networks. It can be operated by a single user, but also by many different users at the same time.

In order to support the user in his daily tasks, the context sensitive help function allows for quick and easy access to desired information with just one press of a button. The respective user guides provide comprehensive information and are continuously updated.

For even more flexibility and customization configurable database fields allow you to enter any additional information, such as IP addresses, equipment configuration or capacity to display, for example, bottlenecks in the network.

CHIRplus_TC

Key Advantages

- Many years of experience and technical know-how
- Latest ITU and other national and international recommendations are implemented
- Continuous implementation of latest technologies (wireless IoT, 5G, SmartGrid)
- Database independent
- Smooth workflows and great usability
- Optimized map handling & visualization

Benefits

- Practice-proven features, functionality and calculation methods
- Always up to date calculation methods, high planning accuracy
- Future-proof calculation methods and functionality
- Scalable, flexible solution
- Faster planning process
- Detailed presentation of results, structured and customizable map views

CGA

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