Acknowledgements

Publication is the result of the research work sponsored by the Polish Committee for Scientific Research, PBZ 01915 "Microsystems for the total analysis of the multi-component gaseous media".

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OPTICAL LINKS OF DATA TRANSMISSION IN CITY AREAS

Modernly produced optical links of data transmission, which are working in an opened waether area on infrared waves, are used as links of data transmission in cities. Optolines are used for fast construction of connections on distances ranging from tens of meters to several kilometers. They are used to transmit bit rates of 2Mbit/s or n*2Mbit/s.

The article presents the operational estimate of usefulness of the optoline working on waves of λ = 0,86 - 0,92μm spectral range. Despite low estimates of the product a new prospect appears before it. New technologies enable optolines to work on waves of λ = 9 - 12μm spectral range and are the future for evolution of that practical device.

The article also speaks of expectations in the subject of transmission parameters.

1. INTRODUCTION

The need for telecommunication services in large cities is growing rapidly. Telecommunication systems in these areas often need reconstruction, but these are very costly and long lasting operations because they interfere with the technical structure of the cities. They

require long negotiations as well as various permissions. Such problems concern the construction of lines (copper and fiber optics) but also radio links. The development of telecommunication infrastructure in cities requires of course such operations but until all cost effective, economically corroborated possibilities are exhausted, we extent the telecommunication systems to their maximum capabilities. For instance, system extension SDH w/STM4 to STM 16 or STM 64, multiplication DWDM on fiber optics lines.

In developing cities there is often a need to quickly set in motion a new transmission link while lacking adequate system in point of receive. There are different ways to solve such a problem. The solution depends on the technical capabilities and the deadline for setting in motion the transmission link. Nowadays, with a large competition on the market, meeting the deadline as fast as possible is essential. A fast connection of cable line as well as radio link is impossible, however it is possible if optoline is used assuming the connected objects are within optical visibility (tens of meters to few kilometers). What speeds up such an installation is the fact that it doesn't require any permission from outside institutions, administration-lack of bureaucracy.

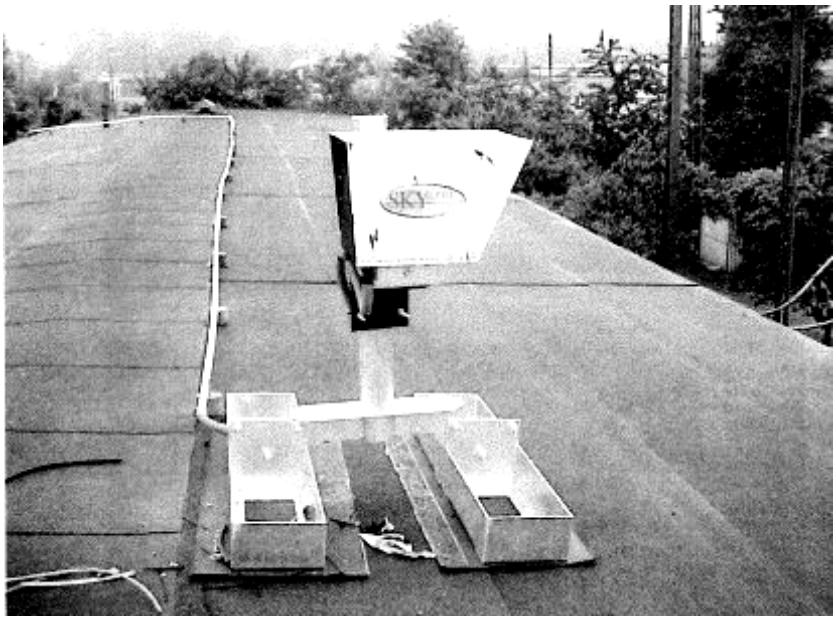
2. OPTICAL LINKS OF WAVELENGTH INFRARED – EXPLOITATION CONCLUSIONS

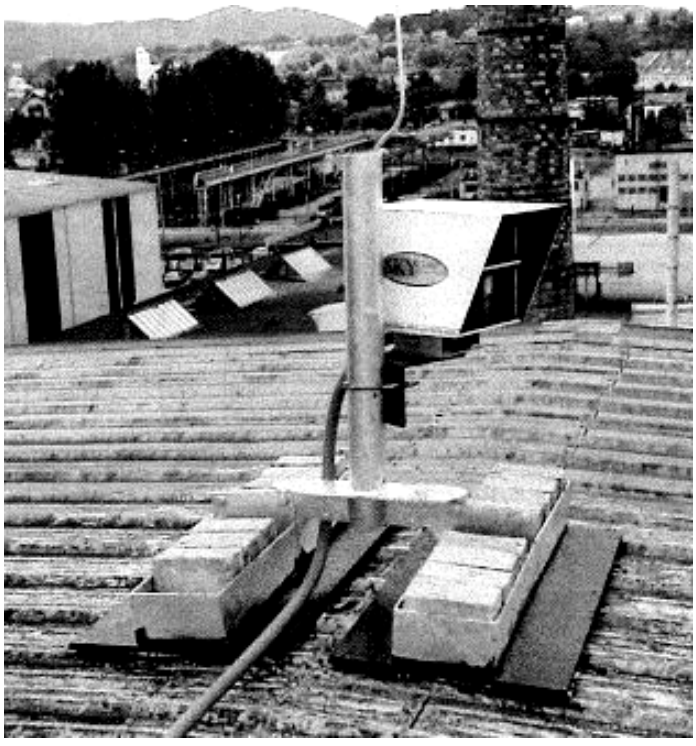
The idea of transmitting signals, using infrared waves in an opened weather areas are known for a long time. However, the level of technological development for these conditions of transmission wasn't satisfactory for spreading this technology. In modern times we construct and exploit optolines that are working on short wavelength infrared (approximately 0,9 μm) and up to several kilometers. In everyday life exploitation especially with bad weather conditions and bigger air pollution, these devices don't work too well and are not sufficient for even a normal level of retransmission quality (the accessibility of the link in a year is 98,75 %; with a maximum number of transmission failure equal to 500 – so called III category of reproducibility. Producers of optolines stipulate that while choosing a device according to the power of the laser and the distances complying with its indications, considering that the weather conditions will be over the following limitary values, the system might be disturbed:

- rainfall – 15cm/h
- wet snowfall – 10cm/h
- snowfall – 5cm/h
- Visibility in fog not less than 6 % of transmission distance

In practical exploitation conditions, we have examined two series connection links from the SkyCom optoline within the period of one year (phot.1) working within $\lambda = 0,86 - 0,92$ μm.

We have also conducted transmission tests according to G.703. (according to the scheme as on drawing 1)





Phot. 1. Optolines SkyCom

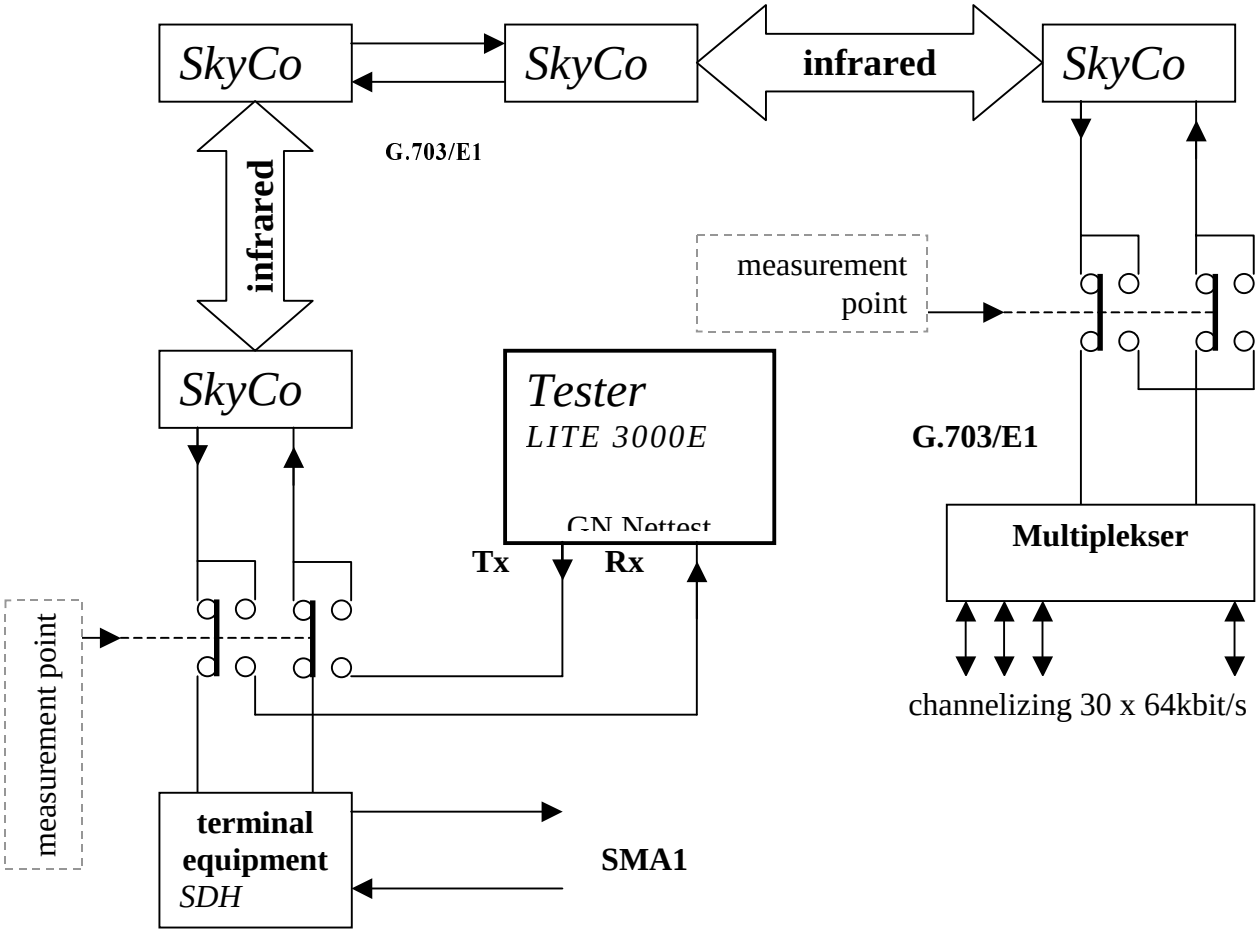


Fig. 1 Transmission link with measurement system

From the experiences acquired during that year we learn that optolines shouldn't really be applied in our climate zone on the proposed distances of up to 6km. These devices work well on small distances (less then 1km), when we use much more powerful transmitter.

It means that when we use an optoline SkyCom G.703/E1/1400 or G.703/E1/6000 within a range of few hundred meters it means using in fact one that is meant for working in "good" weather conditions in the range of 4-6 km.

3. DEVELOPMENT PROSPECT

Despite introduced early technological advantages of optolines, the presented results and exploitation practice are not too encouraging. As we see, the quality of transmission depends on the atmospheric conditions on a chosen wavelength – around 0,9 μm (drawing 2). The research of atmospheric transmittance in the function of wavelength infrared show that we can obtain better transmission parameters on a larger wavelength. For this type of transmission it's suggested to use transmitted band within 3,5-4 μm spectral range, or for best results within 9-12 μm. (drawing 2). Until now the lack of appropriate sources of radiation and appropriate quality of long–range radiation detectors has made this idea impossible to implement. However, denunciation of elaboration of a laser working on $\lambda = 10{,}5$ μm wavelength and better long–range radiation detectors that can be used in an optoline working conditions, produced among other countries in Poland, will allow in the near future the development of new generation of optolines.

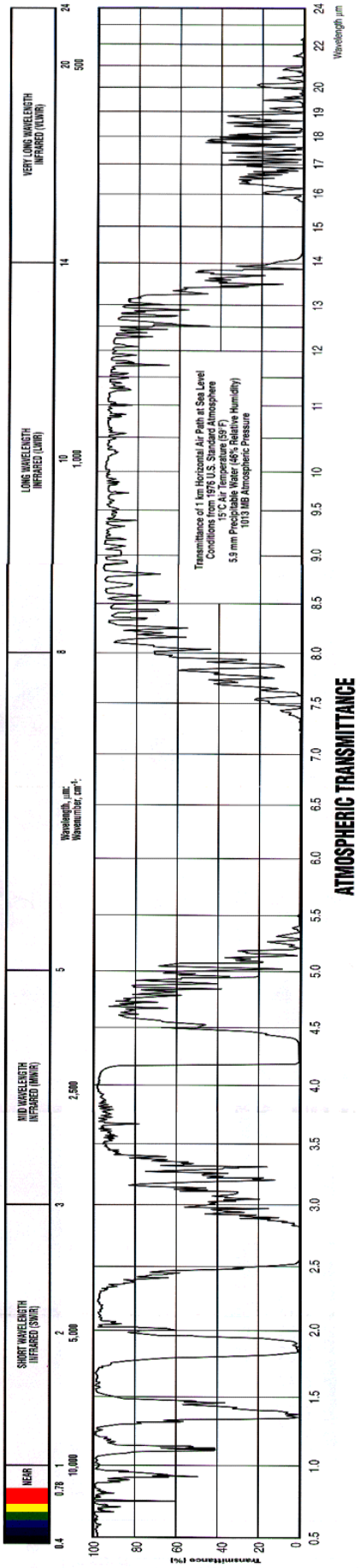


Fig. 2 Atmospheric transmittance

The elaboration of germanium optics with appropriate antireflective coats adapted to wavelength used is not a problem for termovision devices producers. Also the production of appropriate "windows" for mechanical protection against pollution for germanium optics, admissible for that particular wavelength, is a known technology. From the interface perspective we should expect speed of transmission around 1 to few Gbit/s which of course depends on the adapted interface together with a multiplexer that allows to divide the stream into smaller ones, for instance: E1, E3, etc. according to the needs of telecommunication markets.

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SELECTION OF WAVELENGTHS FOR OPTOELECTRONIC CO AND O_2 CONCENTRATION ANALYSER

Keywords: combustion, control, corrosion, absorption spectroscopy

Measurement of CO and O2 concentration near walls of a power burner allows limiting adverse side effects of the low-emission combustion. Conditions in which the measurements have to be made restrain the selection of wavelength used in absorption spectroscopy method. The article describes the absorption spectroscopy basics as well as the restrains that have to be considered when selecting the wavelengths.

1. INTRODUCTION

The so-called low-emission combustion technologies used in contemporary power industry have limitation of nitrogen oxides (NO_X) atmospheric emission as their purpose. Low-emission technologies consist in creation reach and lean zones in a combustion chamber. It allows decrease of NO_X in flue gases.