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Transmitting and receiving equipment for radiocommunication - Transciever technologies and their performance standards -
Part 1: Low phase-noise oscillator technologies using photonics techniques

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The text of this Technical Report is based on the following documents:

Draft	Report on voting
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Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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– reconfirmed,

– withdrawn, or

– revised.

INTRODUCTION

A frequency-stabilized oscillator is an indispensable device in radiocommunication due to the radio regulations and reduction of the computing resources for frequency offset compensation in the demodulation process. In principle, the combination of crystal oscillators and multipliers has been used for the generation of the microwave signal in conventional microwave bands, as well as lower millimetre-wave frequency bands less than 40 GHz. Raising the carrier frequency of radiocommunication is necessary to increase the wireless transmission capacity. In this scenario, the multiplication factor also increases and finally, the phase noise of the signal is degraded. An intrinsic phase noise degradation by the multiplication is expressed by 20 log m, where m is a multiplication factor. For the realization of the advanced modulation formats such as an orthogonal frequency division multiplexing with a multilevel modulation, a low-phase noise oscillator is necessary.

An optoelectronic oscillation technique is a promising solution for achieving both high oscillation frequency and low phase noise, as the optical transmission technique, thanks to the broadband nature of optical signals, makes it possible to obtain a long cavity with a high quality factor. In this document, the principle of the optoelectronic oscillation and an example of the usage for the radiocommunications are shown as a guideline to the experts and engineers, who design and develop the radiocommunication transceivers in high frequency millimetre-wave systems and terahertz-wave systems.

1 Scope

Millimetre wave and terahertz wave radio communication services require low phase noise oscillators in order to comply with radio regulations and reduce the computing resources required for demodulation processes. This document provides the principle and application of the optoelectronic oscillation technologies using the photonics technique as a guideline for the design of the radiocommunication transceivers.

2 Normative references

There are no normative references in this document.

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