

Telecommunications | Technology Offer

## Optical 8-level Differential Phase-Shift Keying (8-DPSK)

### Field of application

The most widely used modulation format for optical signal transmission over optical fibers is binary intensity modulation (IM) and recently also binary Differential Phase-Shift Keying (DPSK). Both formats transmit only 1 bit information per symbol. Multilevel optical modulation formats with up to 3 bit information per symbol increase spectral efficiency compared to binary methods and possess at the same time higher tolerance against the typical impairments during transmission.

### Drawback of current technologies

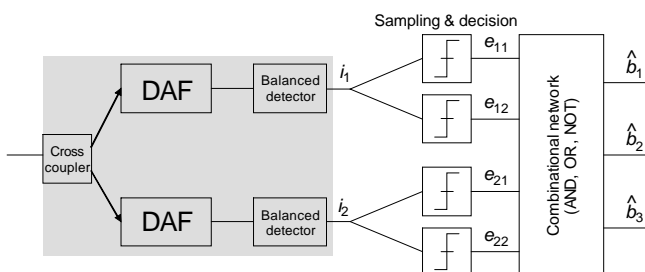
The need for always faster transmission of increasing amounts of information is still growing and reaches even into access networks. At the same time the cost of the used techniques has to be reduced. Nevertheless the new technologies for modulation and demodulation of optical signals have to meet growing demands for tolerance against transmission impairments, such as signal distortion by dispersion.

### Secure your innovation advantage

At the Universität Stuttgart (Germany) a new method and device were developed, which demodulates optical signals with 3 bit information per signal with at the same time reduced technical complexity of the receiver.

### Patent situation

The European patent EP 1 741 212 B1 is granted in Germany, Great Britain and France. An US patent application US 11/568,440 is filed.



Systematical design of the new receiver

### Innovation

The invention describes a new method to demodulate optical 8-level signals (8-DPSK). The corresponding receiver needs only two delay & add filters with balanced detectors to produce the electrical signals, which are processed by four binary sampling & decision devices. At this point multilevel electrical signals are allowed. To estimate the transmitted bit sequences a simple logic or a look-up table can be used. Existing receivers for Differential Quadrature Phase-Shift Keying (DQPSK) can easily be upgraded as the optical and electro-optical components are the same and only the logic has to be changed.

### Your advantages at a glance:

- 3 bit information per transmitted symbol
- reduced technical complexity for demodulation of the signals
- reduced costs as only two DAF are necessary
- cheap upgrade of existing DQPSK receivers to 8-DPSK
- higher tolerance against dispersion during optical fiber transmission

### Technology transfer

The Technologie-Lizenz-Büro GmbH (Germany) on behalf of the Universität Stuttgart offers interested companies the opportunity to acquire an appropriate license for this innovative technology. Furthermore, the research group is interested in industry collaboration to undertake further joint developments.

For further information on „8-DPSK“, please contact Michael Ott at [ott@tlb.de](mailto:ott@tlb.de)

Technologie-Lizenz-Büro (TLB)  
der Baden-Württembergischen Hochschulen GmbH

Ettlinger Straße 25, 76137 Karlsruhe, Germany  
Tel. ++49 (0)721 79004-0, Fax ++49 (0)721 79004-79  
[www.tlb.de](http://www.tlb.de)