The Status of NAVIPEDIA

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NAVIPEDIA: the GNSS wiki


www.navipedia.org
The current GNSS international scenario is very dynamic (GPS modernisation, Glonass modernisation, Galileo, COMPASS, QZSS, IRNSS, new SBASs, …). It is then difficult to keep track of the latest evolutions and books on GNSS are rapidly outdated and incorrect information is scattered over the internet.

In this context, NAVIPEDIA is launched by ESA aiming at having a single entry point GNSS educational portal (or wiki) to support the transfer of GNSS know-how providing a common, complete and trustable compilation of reference updated knowledge in GNSS.

NAVIPEDIA is conceived as a collaborative GNSS on-line encyclopedia with the objective to foster the transfer of knowledge in the field of GNSS.

NAVIPEDIA is an ESA initiative in the context of the EGEP ESA Program freely accessible to the public.
NAVIPEDIA potential users include:

- GNSS-related institutions;
- GNSS industries and involved professionals;
- GNSS present and potential future users;
- GNSS present and potential future service providers;
- Academic environment (i.e. Educators and students; Universities and Schools);
- The general public interested on GNSS.

In order to cover these different needs, all articles in NAVIPEDIA have been categorized in three different levels:

**Basic** – aiming at the general public without technical knowledge of GNSS

**Medium** – aiming at students, scholars and professionals seeking detailed technical information

**Advanced** – aiming at scholars and GNSS professionals seeking very detailed technical knowledge on specific aspects of GNSS technology
NAVIPEDIA: ORGANISATION


Main Categories

Browse Articles by Category

- **global navigation satellite systems**
  - GALILEO
  - GPS
  - GLONASS
  - COMPASS

- **satellite based augmentation systems**
  - EGNOS
  - WAAS
  - MSAS
  - other SBAS

- **regional navigation satellite systems**
  - IRNSS
  - QZSS
  - other regional systems

- **fundamentals, receivers and applications**
  - GNSS fundamentals
  - GNSS receivers
  - GNSS applications

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MBOC Modulation

Contents

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2 Implementing MBOC
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4 MBOC Interference with other GNSSes
5 References
6 Credits

MBOC modulation definition and analysis

Nearly twenty months after the EU and the US signed the Agreement on the Promotion, Provision and use of Galileo and GPS Satellite-Based Navigation Systems and Related Applications an optimized signal waveform named MBOC (Multiplexed Binary Offset Carrier modulation) was proposed by a common group of experts of the EU and US for GPS L1C and Galileo E1 OS [G.W. Hein et al., 2006a] [1], [G.W. Hein et al., 2006b] [2] and [J.-A. Avila-Rodriguez et al., 2006d] [3].

Except for the fact that the CBCS definition requires Interplex to multiplex all the signals, the MBOC modulation can be seen a particular case of the CBCS solution where the BCS sequence adopts the known sine-phase BOC-like form. In this sense, MBOC(6,1,1/11) could also be expressed as CBCS[(1,-1,1,1,-1,1,1,1,1,1,1,1)/1,1/11] if the requirement on the Interplex Multiplexing were abandoned. The main objective of the common GPS and Galileo signal design activity was that the PSD of the proposed solution would be identical for GPS L1C and Galileo E1 OS when the pilot and data components are computed together. This assures a high interoperability between both signals. This normalized (unit power) power spectral density, specified...
ESA NAVIPEDIA allows also to access a large number of educational material produced by ESA, among which:

- **Access on line to the ESA GNSS Data Processing Book** - TM-23: this two-volume book contains a self-learning course and software tools aimed at providing the necessary background to start work in an operative way in GNSS navigation.

- **GLAB tool** which performs precise modeling of GNSS observables (pseudorange and carrier phase)

- **SBAS dedicated education tools:**
  - SBAS Simulator
  - SBAS teacher SBAS mentor
  - SiSnetLab
  - EGNOS toolkit
NAVIPEDIA: Status

- In line with ICG2012 recommendation on NAVIPEDIA, ESA has been maintaining and developing further NAVIPEDIA with up-to-date information.
- NAVIPEDIA is today extensively used by universities and Galileo application developers.
- NAVIPEDIA is also used as reference as part of the European Satellite Navigation Conference (ESNC) for the GNSS application developers.
- An APP version of NAVIPEDIA (for both Android and iOS operational systems) is currently under development. This should be ready by the end of 2016.
- By October 2016, more than 1 million visits received on NAVIPEDIA website so far (www.navipedia.org)
- Most visited articles are on GNSS fundamentals and GNSS applications.

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NAVIPEDIA and ICG

- ESA is pleased to offer NAVIPEDIA as a solid and global reference in GNSS education.

- ESA encourages the ICG Community to participate in the further development of NAVIPEDIA by reviewing and contributing to its educational activities.