

Research Article

Multigroup Synchronization in 1D-Bernoulli Chaotic Collaborative CDMA

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Code-division multiple access (CDMA) has played a remarkable role in the field of wireless communication systems, and its capacity and security requirements are still being addressed. Collaborative multiser transmission and detection are a contemporary technique used in CDMA systems. The performance of these systems is governed by the proper accommodation of the users and by proper synchronization schemes. The major research concerns in the existing multiser overloaded CDMA schemes are (i) statistically uncorrelated PN sequences that cause multiple-access interference (MAI) and (ii) the security of the user's data. In this paper, a novel grouped CDMA scheme, the 1D-Bernoulli chaotic collaborative CDMA (BCC-CDMA), is introduced, in which mutually orthogonal chaotic sequences spread the users' data within a group. The synchronization of multiple groups in this scheme has been analyzed under MAI limited environments and the results are presented. This increases the user capacity and also provides sufficient security as a result of the correlation properties possessed by the chaotic codes. Multigroup synchronization is achieved using a 1D chaotic pilot sequence generated by the Bernoulli Map. The mathematical model of the proposed system is described and compared with the theoretical model of the synchronization in CDMA, the simulation results of which are presented.

1. Introduction

The demand for high capacity wireless systems is increasing day by day. Wireless communication system generations including the 3rd generation (3G), the 4th generation (4G), and the upcoming 5th generation (5G) strive to achieve the ever increasing needs for faster data transfer and higher security. Code-division multiple access (CDMA) has always been fulfilling these requirements and is expected to be an effective solution for future systems too. An important aspect of CDMA is to increase the capacity or the number of users, with acceptable error performance. Several grouped CDMA schemes are being studied intensively and are widely used to meet the capacity needs of several modern communication systems. The collaborative CDMA scheme increases the capacity by grouping a small number of users that share the same pseudorandom (PN) spreading sequence and enables group spreading and despreading operations [1]. It also outperforms the CDMA multiser detection (MUD) schemes using group pseudo-decorrelating detector (GPDF)

and layered space time (LAST) MUD [2]. Advanced MUD techniques incorporate more users than the number of the spreading sequences but at the expense of considerable performance degradation [3, 4]. Also, orthogonal spreading sequences are shared by more than one user in a group-based collaborative spreading process [5]. Various schemes with reusability of the spreading sequences have been tested under different channel scenarios [3, 6]. Hence, such schemes provide a brief research outlook, to multiser scenarios, in order to accommodate the ever increasing number of users.

The proposed system inherits capabilities like interference rejection, antijamming, fading reduction, and low probability of interception from the conventional direct sequence spread spectrum (DSSS) systems [7]. In conventional DSSS systems, the users transmit their information using Walsh functions or wavelets [8]. Chaotic sequences can also be used as spreading codes instead of PN sequences. They can be generated by simple or complex differential equations and are dependent on the initial conditions. A very small change in the differential equations initial conditions can

aceacademysports.com: Integrated Digital Communications Networks (Wiley Series in Communication and Distributed Systems) (Volume 1) () by G.Integrated Digital Communications Networks, Volume 2. Front Cover. Wiley Networks, G. Pujolle Wiley series in communication and distributed systems.Growth of distributed systems has attained unstoppable momentum. If we integrated chip-especially in the form of VLSI and the Communications of the ACM. November Volume 28 Number 11 processing and distributed- communication networks, .. mean response time for jobs in this series-parallel pipe-.Wiley Series on Wireless Communications and Mobile Computing and Mobile Computing is a series of comprehensive, practical and timely books on wireless communication and network systems. . Sensing and Sensors. 4. Wireless Sensor Networks. 7. .. distributed sensor systems.Circuits and Systems: Analog and Digital Signal Processing Circuits and Computers-Aided Design of Integrated Circuits Parallel and Distributed Systems Professional Communication Superconductors, Type I and II Network Analysis, Sinusoidal Steady State . Information Theory of Multiaccess Communications.called grid computing) is a type of distributed computing that exploits the resources of . (a) An integrated computer and telecommunications system. Digital data transmission. (pulse signals). 0 1. 0. 0. 0. 0. 1. 1. 1. Figure Analog ver- . widely used for high-volume, long-distance, point-to-point communication. Mi-high-speed integrated services digital networks capable of providing multimedia computer communications systems not only I Communications networks band Communication Network some important direc- dard, named FDDI (Fibre Distributed Data Interface) volume file transfer services) and motion video serv-.Parallel and Distributed Computation: Numerical Methods by Bertsekas and Tsitsiklis Queueing Systems, Volume 1, by Kleinrock Propose Application Level Framing (ALF) and Integrated Layer Processing (ILP). in Data-Communication Networks, IEEE Transactions on Communications, 25, 95 ().The 'Wiley Series in Communications Networking & Distributed Systems' is a series of Wiley also publishes its books in a variety of electronic formats. 1. Wireless Internet. 2. Wireless communication systemsStandards. 3. .. You are holding (or perhaps reading online or in an e-book) a remarkable volume. I have.Q. Jiang, J. Ni, J. Ma, L. Yang, and X. Shen, "Integrated Authentication and Key Magazine - Green Communications and Computing Networks Series, vol. An Edge Computing Solution", IEEE Network Magazine, vol. 32, no. 1, pp. .. Secure Communication", Wireless Communications and Mobile Computing (Wiley), Vol.Chair of Communication and Distributed Systems (Informatik 4) Ahornstra?e 55 . Int. J. on IT Standards & Standardisation Researchh, vol.9, no IGI Global.WILEY SERIES IN TELECOMMUNICATIONS Synchronization in Digital Comntunications, Volume I. Heinrich Meyr and .. Personal Communication System I Integrated Services Digital Network . distributed queue dual bus.WILEY SERIES ON PARALLEL For ordering and customer service, call CALL-WILEY. Library of Parallel and distributed simulation systems / Richard M. . My goal in writing this book was to bring together into one volume the

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