

L I A O N I N G U N I V E R S I T Y
O F T E C H N O L O G Y

GRADUATION PROJECT (THESIS) OPENING REPORT

Title Design and Implementation of QAM Transmission System

College of Electronic & Information Engineering

Institute (Department) Communication Engineering Major

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Date 2014 march 14

Opening Report

1 The origin and the theoretical or practical application significance of the graduation design (paper) title

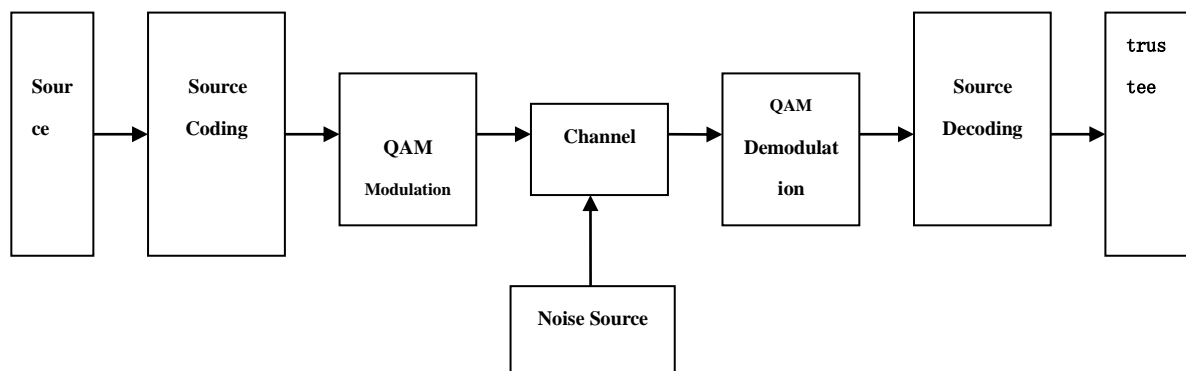
Source topics from production practices.

Topics practical significance

Quadrature amplitude modulation QAM is a jointly -controlled phase and amplitude digital modulation techniques. It is a very wide range of applications, not only in the field of mobile communications and cable television transmission, digital video broadcasting, satellite communications and other fields have been widely used. Quadrature Amplitude Modulation (QAM) is a relatively efficient power and bandwidth channel modulation technology, large-capacity digital microwave communications systems, cable television networks in the field speed data transmission, satellite communication systems, has been widely used. On a QAM carrier amplitude modulation of two quadrature modulation. These two carriers are 90 degrees is usually ($\pi / 2$) sine wave , and therefore is called orthogonal carriers. Quadrature amplitude modulation QAM is a digital communications often use digital modulation techniques, especially any QAM with high bandwidth efficiency in traffic bandwidth efficiency becomes increasingly making the case the main contradiction, orthogonal amplitude modulation is a better choice.

2 Main contents and prospective goal of the title.

The main contents of this design: first understand the important role of modulation techniques and development status. And skilled palm QAM modulation and demodulation techniques basic principles, and build a simulation model, simulation MQAM performance analysis. Secondly digitize analog signals and build the model, can be PCM, DPCM, ADPCM, SBC and other technologies. Final Construction QAM transmission system, and voice signals, analog signals, digital signal transmission the overall block diagram as shown in Fig1.



(note) opening report points:1 the origin and the theoretical or practical application significance of the graduation design (paper) title. 2 main contents and prospective goal of the title. 3 which method and means you plan to use. 4 the required experimental or practice conditions to complete the title. 5 the work plans to complete the title. (If the paper is not enough, you can complete it on another same format A4)

Fig1: The overall block diagram of a system

This design is mainly composed of five parts on the map, on the face of the analysis based on workflow, system software can be divided into the following functional blocks:

- 1) Information source: convert various messages to the original signals.
- 2) Source coding and decoding: First, improve the effectiveness of information transmission, compression techniques that seek to reduce the number of symbols and symbol rate reduced by some data. The second is to perform the analog / digital (A / D) converter, i.e., when the source is an analog signal is given, the source encoder converts a digital signal to enable digital transmission of analog signals.
- 3) Digital modulation and demodulation: the spectrum of the digital baseband signals move to high frequencies, form suitable for transmission channel passband signal.
- 4) Channel: to transmit a signal from the transmitting device to the receiving end, is a physical media.
- 5) The trustee: Send a message destination, its function and source the contrary, that is to restore the original message into a corresponding electrical signal.

The expected objectives to be achieved :

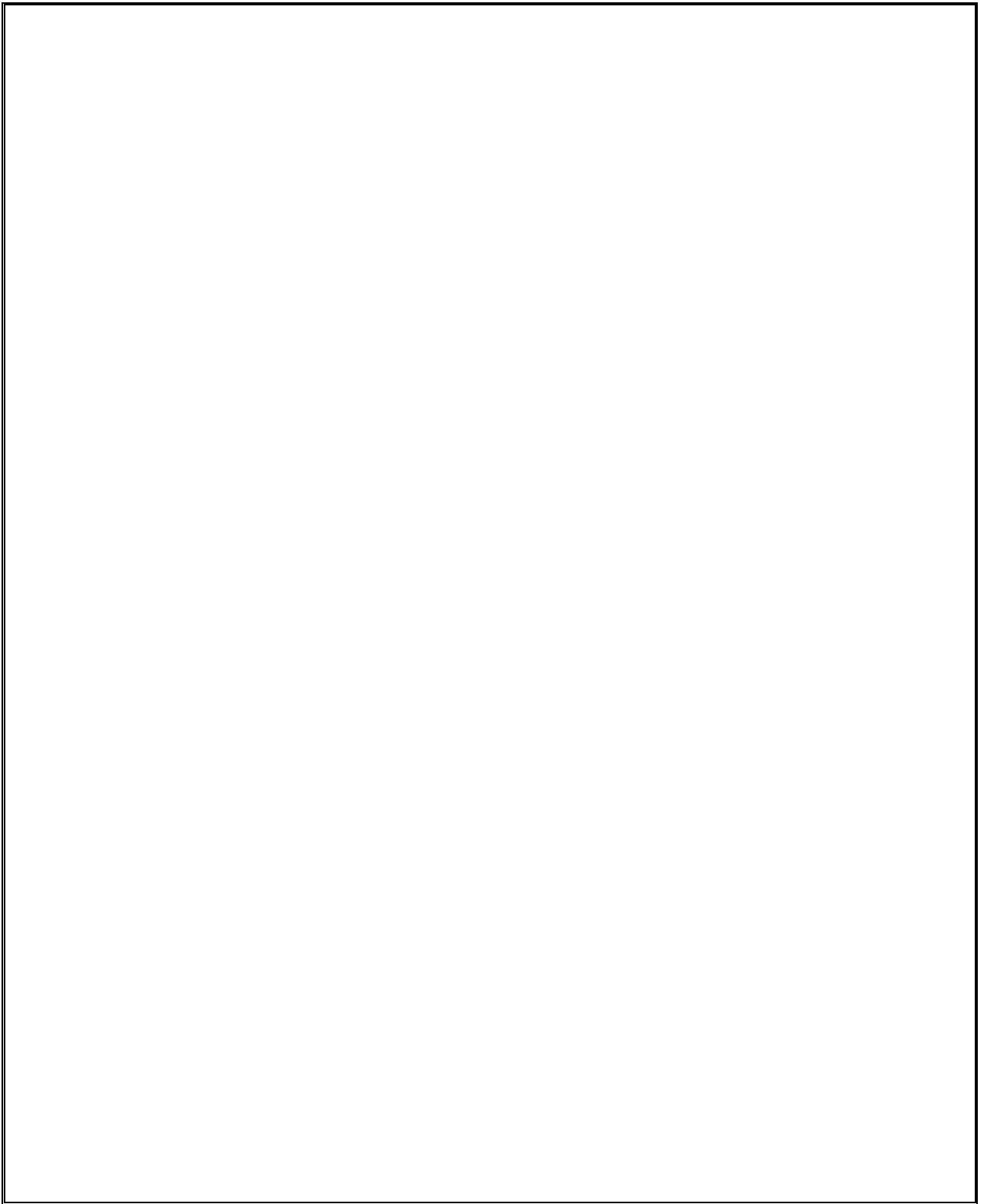
This design is expected to build QAM transmission system, voice signals, analog signals, digital signals transmitted in the transmitting and receiving process in a distortion allowed and must be true in the case of allowing to recover the original signal. To minimize the error rate of transmission of voice signals in order to ensure the clarity of the speech signal to reduce the noise. In order to improve the effectiveness of communications systems, namely to improve bandwidth utilization of the system, the need to improve the value of M-ary number, but the larger M, anti-jamming capability of the system, the worse that improve bandwidth efficiency is lower power utilization for the price. So you need to select the appropriate value of M, so that the bandwidth utilization and error rate within the allowable error range.

3 Which method and means you plan to use.

The main flow of this design is the analog signal source output analog signals, the analog signal can be a sound signal or image signal; On the transmit side, the analog signal through DPCM coding, data compression, and the analog signal is digitized, and then through after QAM modulation emitted; channel transmission through the channel on the one hand to provide access, on the other hand will inevitably come noise, the main consideration additive noise, such as white Gaussian noise; at the receiving end, after the first QAM demodulation, then its DPCM Decoding distortion allows some cases eventually recover the original signal. Communication system performance indicators are: transmission rate, error Bit rate, bandwidth utilization.

4 The required experimental or practice conditions to complete the title.

The subject of design, the need for development status QAM system and the basic principles of architecture has a certain understanding and practice to master modulation and demodulation techniques. Need access to information through the Internet and books, and collate relevant information and induction first, serious study and mastery and proficiency in the use of scientific knowledge, to develop programs. And the need for phase SYSTEMVIEW and MATLAB Off-depth learning simulation software, and then build a QAM transmission system and associated simulation and performance analysis.



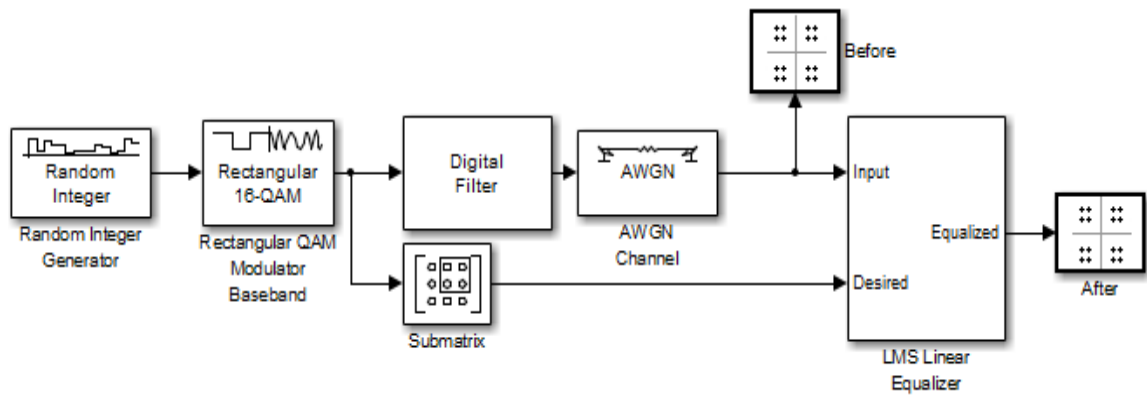


Fig2: QAM transmission system

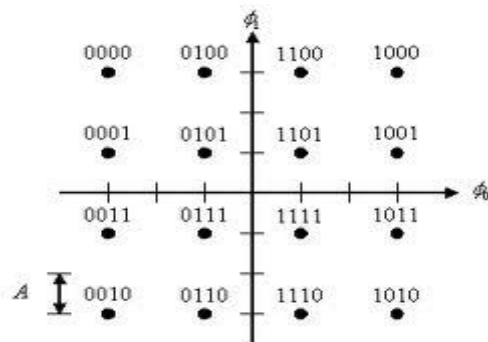


Fig3: Constellation 16 QAM

5 The work plans to complete the title.

- Week 1: Field survey and study.
- Week 2: Find information.
- Week 3: Understand the QAM system development present situation.
- Week4: The basic principle, architecture, prepare proposal defense.
- Week 5: Learning the use of Matlab/Simulink simulation software.
- Week 6: Internship in Jinzhou Unicom. Master QAM modulation technology.
- Week7: Internship in Jinzhou Unicom. Building simulation model, the simulation waveform.
- Week 8: Master the QAM demodulation technology and build simulation model.
- Week 9: The simulation waveform.
- Week 10: Complete QAM performance simulation analysis; prepare interim reply.
- Week 11: Realize analog signal digitization.
- Week 12: Building models, etc.
- Week 13: The construction of QAM transmission system.
- Week 14: Realize analog signal, speech signal and digital signal transmission simulation.
- Week 15: Performance analysis.
- Week 16: Writing thesis.
- Week 17: Preparation of the defense.

Access to information, documents directory

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- [17] Jablon, N.K., Joint blind equalization, carrier recovery and timing recovery for high order QAM signal constellations. Signal Processing, IEEE Transactions on, 1992.40(6): p. 1383-1398
- [18] Yongxue, Z., et al. Practical implementation of blind equalization, carrier recovery and timing recovery for QAM cable receiver chip. in ASIC, 2003. Proceedings. 5th International Conference on. 2003.
- [19] Jeruchim, M.C., P. Balaban, and K.S. Shanmugan, Simulation of communication systems:modeling, methodology, and techniques. 2nd ed. Information technology--transmission, processing, and storage. 2000, New York: Kluwer Academic/PlenumPublishers. xxvii, 907 p.

Teachers opinion:

(The opinions of the depth , the breadth and workload, and the prediction of the design result)

CHADLY MOUKOURI NGAMI has the full investigation in accordance with the tasks assigned by teachers. Serious search for the subject of the transmission technology, modulation and demodulation information, knowledge of QAM. Obtain some valuable information, and have a preliminary understanding of the QAM transmission system design content, preparation more fully.

The difficulty of the subject is moderate and full workload. Student has seriously considered a more reasonable design, and corresponds to the purpose to do a preliminary analysis. Clearer design ideas, insights, and work plan is reasonable, and has completed the opening report. I hope that the student is capable of independent thinking, successfully complete the graduation project tasks in a subsequent design.

Agree that the students into the graduate design.

Teachers signature:

Date:

Staff room opinion:

Consent to enter the graduation design stage.

The director of department signature:

Date:

Note for the Opening Report

- 1、 Students should fill in the opening report carefully. During the defense of the graduation design (paper), students should hand in the thesis proposal to the rejoin committee (or the respondent group), as the reference of the defense score. Without thesis proposal, you cannot participate in the defense. If losing the proposal, you should deal with the formalities fill in time. Students after graduation, thesis proposal and student graduation design (paper) file with the record.
- 2、 Graduation design (paper) subject once determined, the teacher will give students the graduation design task. Students should complete the thesis proposal according to the requirement of the task. Generally speaking, the tasks officially begin at the second week to the third week of the graduation design (paper).
- 3、 The opening report is reviewed by the professional staff, each students is given 10-15 min. After passing the review, students can get the official qualification to prepare the graduation design (paper).
- 4、 Students should understand the content and the requirements of the graduation design (paper) completely, and make a practical plan under the guidance of the teachers. The required conditions of the experiments and the practice should be indispensable.
- 5、 Students should be serious on the literature information retrieval, collect and consultation, and make record according to the requirements in the task.
- 6、 Students who do not gain the qualification should restart the proposal within a week.