

## PREFACE

The gratitude to the presence of Allah.. This thesis is structured to meet one of the requirements obtained Master degree in Engineering (M.T.) in Electrical Engineering S2 Program in Telkom University, Bandung, Indonesia.

In completing this study, thanks to the encouragement, guidance, and assistance from various parties. therefore, the author would like to thank:

1. PT. Telekomunikasi Indonesia, as an institution which has provided educational opportunities and scholarships at Telkom University.
2. Prof. Ir. Mochamad Ashari, M. Eng., Ph.D., as Rector of Telkom University, which has provided the opportunity to study in Telkom University.
3. Dr. Rendy Munadi, Ir, as thesis supervisor I, who has provided guidance and advice during the preparation of this thesis.
4. Ms Sofia Naning H, ST., MT., as thesis supervisor II, which has provided guidance and advice during the preparation of this thesis.
5. Dr. Yosef Fiky Suratman, as Chairman of the Electrical Engineering S2 Program in Telkom University, which has been a lot of give direction in education at Telkom University.
6. All Lecturer of Electrical Engineering S2 Program in Telkom University, which has been a lot to share knowledge and interactions.
7. All staff of Electrical Engineering S2 Program in Telkom University, which has been of much help in studying in Telkom University.
8. Beloved Parents, which had been planted the seeds of hope and enthusiasm, so that the writer has the determination to resolve this education.
9. Beloved Wife and beloved Children, who have given encouragement and understanding so that I can finish this Education.
10. Leaders, Staff and Employees PT. Telekomunikasi Indonesia Tbk, particularly in Witel Madiun and Pasuruan, East Java, which has been willing to provide support, information, data and share experiences to help in the preparation of this thesis.
11. Students Fellow of Electrical Engineering S2 Program in Telkom University, who has always given the spirit of the Class and the completion of this thesis.

May Allah give a reply on the mind of all sides that authors mentioned above. The authors realize that writing is far from perfect, therefore, the author expects suggestions and constructive criticism in the hope to achieve better results in the future. Finally, the authors hope this thesis benefit us all especially for the development of science that are environmentally friendly.

Bandung, 02 September 2016

Muhammad Zen Effendy, ST.