Improvement of the Official Examinations for the Signal Quality of the Cable TV Systems in Taiwan: the Modification of the Automatic Measurement Software

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Abstract

This study presents the modification of the program using the HP VEE to promote the portability of the measurement equipment for the official examinations for signal quality of the Cable TV (CATV) systems in Taiwan. This program is designed to communicate between the head end and the user end with Modems. In the previous version of the examination procedures, the official inspectors of the Directorate General of Telecommunications have to bring the CATV spectrum analyzer, active filter, video measurement set, down converter, and demodulator connected with a notebook to measure the parameters of the signal quality at the user end. The goal of this study is to modify the enormous program which are inter-talking at the two ends by skipping the measurement of the K factor to reduce the equipment to be only a CATV spectrum analyzer and an active filter. By the HP VEE, we can easily set the instruments in the pseudo mode. Therefore, we can modify the program to skip the measurement of the detached machine to achieve our goal. We have easily modified and tested this enormous inter-talking program without query to the original programmers because of the complete graphical programming solutions by linking visual objects or icons of the HP VEE.

Keywords: Cable TV, graphical programming, visual objects, signal quality, HP VEE.

1. Introduction

Graphical programming allows to create complete graphical programming solutions by linking visual objects or icons, rather than using more laborious traditional programming languages such as HP VEE and NI LabView [1]. By simplifying tasks such as test sequencing, instrument control, and user interface development, graphical programming delivers impressive productivity gains. The official examinations for the signal quality of the CATV systems in Taiwan use the HP CATV automatic measurement software that is developed in the HP VEE. This program is designed to communicate between the head end (HE) and the user end with Modems. The official inspectors of the Directorate General of Telecommunications, Ministry of Transportation and Communications can download the measurement plan from the HE to the user end. Figure 1 depicts the functional block diagram of the official automatic measurement for the CATV system [2]. The official inspectors have to bring

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the HP 8591C CATV spectrum analyzer, active filter, Tektronix video measurement set VM 700A, BARC TIC TIC-860 down converter demodulator, and BARC VSD-200 demodulator connected with a notebook to measure the parameters of the signal quality at the user end. The total weight of these instruments is over 40 kgw. To promote the portability of the measurement equipment at the user end without effecting on the quality of the examinations, the Directorate General of Telecommunications proposed to skip the measurement of the K factor for reducing the equipment to be a HP CATV 8591C spectrum analyzer and an active filter (Fig. 2). To achieve this proposal, this study is to modify the enormous programs, which are inter-talking between the two ends. We have easily modified and tested this enormous inter-talking program without query to the original programmers because of the complete graphical programming solutions by linking visual objects or icons of the HP VEE.

2. Method

To achieve the goal of this study, we have modified the program in the HE and user end, respectively. In the HE, the measurement plan is stored in the file DLP.dat. To skip the measurement of K factor, we have modified this data file as Fig. 3. The notebook at the HE will transmit this measurement plan to the user end by way of modem. Therefore, the measurement record will skip the item of K factor at the user end. On the other hand, the program at the user end should be set as the "Live Mode OFF" model for the detached machines [3]. In the "Live Mode ON" model, the I/O errors will occur because of the program can not read data from the detached Tektronix VM700A Video Measurement Set, BARC TIC-860 Down Converter, and BARC VSD200 Demodulator. In Hp VEE, Direct I/O objects provide a function of communicating with instruments without the use of instrument drivers. The program can run without instrument in the "Live Mode OFF."

To verify the feasibility of the aforementioned idea, we have designed the testing procedures as Table I. These testing procedures follow the rule of changing the parameters systematically to observe the change of the results. The experiments were executed in the Northern Taiwan Regulatory Station, the Directorate General of Telecommunications, Taipei, Taiwan. The equipment connected as Fig. 1 (a) shows. A head end simulator was employed in this test.

3. Results and Discussions

The testing results are presented in Table II. In the test (A), the original programs run normally to take the parameters. In the test (B), we detached the machines that wanted to reduce, but did not modify the programs. Therefore, the I/O error has occurred in the measurement of the K factor. This shows that the original programs have to modify to skip the measurement of the K factor. Hence in the test (C), the connections of the measurement instruments have been still unchanged, but the measurement plan DPL.dat at the HE has been modified to skip the item of measuring K factor. The program could normally run without any error. In fact, the modified program made the disconnection of data communication between notebook and the instruments wanted to detach.

Sequentially, we have physically disconnected the instruments as Fig. 1(b) to execute the test (D). The program has normally run in our expectation. In this test, we have reduced the instruments. Finally, in the test (E), we have set all of the detached machines in the "Live Mode OFF" model in the program. The values of the measurement parameters are very closed in the Table Ⅱ. This is verified that the modified program is correct in the measurement. We purpose to modify the program systematically to avoid touching the kernel of the measurement and calculation in the program for not to effect the results of measurement. This ensures that the precision of measurement the modified program is the same to the original one. In the HP VEE, the programs are linked with the visual independent objects, which help us to modify the program without touching the kernel of the measurement and calculation. Hence, we can clearly find the objects that have to be modified. Visual programming is rapidly gaining recognition as a valuable tool for software development. Environments like HP VEE and more general the concept of virtual instrument are examples of the potential usefulness of the visual programming paradigm for measurement and instrumentation technology.

4. Conclusion

This study presents the modification of the program using the HP VEE to promote the portability of the measurement equipment for the official examinations for signal quality of the CATV systems in Taiwan. We purpose to modify the program systematically to avoid touching the kernel of the measurement and calculation in the program for not to effect the results of measurement. This ensures that the precision of measurement the modified program is the same to the original one. We have easily modified and tested this enormous inter-talking program without query to the original programmers because of the complete graphical programming solutions by linking visual objects or icons of the HP VEE.

5. Acknowledgements

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Table I Testing Procedures

Test #	Head End		User End	
	Equipment Setup	Program	Equipment Setup	Program
A	Fig. 1 (a)	Original	Fig. 1 (b)	Original
B	Fig. 1 (a)	Original	Fig. 2	Original
C	Fig. 1 (a)	Modified	Fig. 1 (b)	Original
D	Fig. 1 (a)	Modified	Fig. 2	Original
E	Fig. 1 (a)	Modified	Fig. 2	Modified

Table II The Results of the Measurements

Test #	VCL	ACL	CNR	CTB	XMOD	HUM	KF	FR
A	12.1	14.7	48.2	55.7	48.3	42.5	4.3	0.81
B	12.1	14.7	48.2	55.7	48.2	42.4	Error	
C	12.2	14.7	48.2	55.7	48.3	42.6		0.83
D	12.1	14.8	48.2	55.8	48.3	42.4		0.82
E	12.1	14.7	48.2	55.7	48.3	42.4		0.83

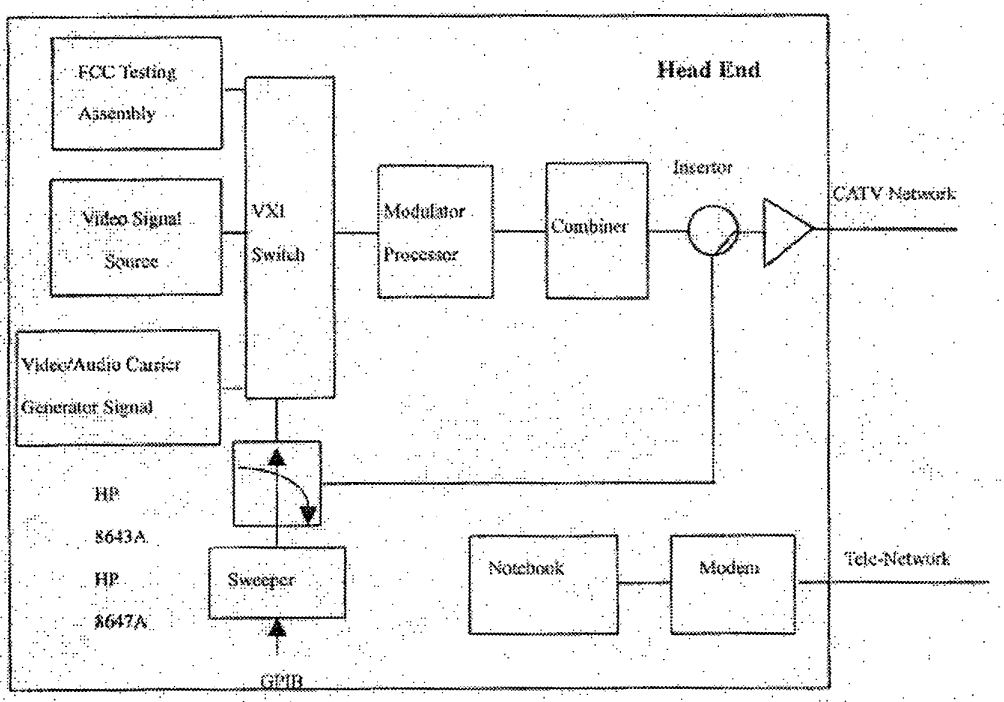

Fig. 1 (a) System setup of the official examinations for the signal quality of the CATV systems in Taiwan at the head end.

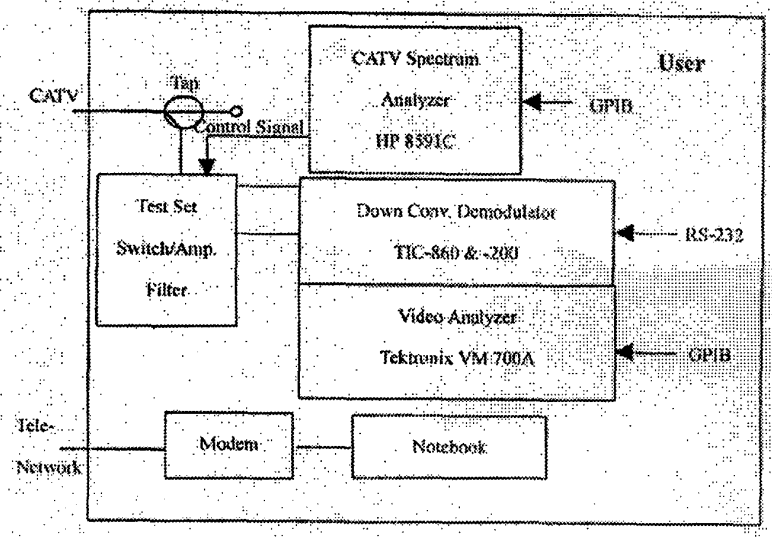

Fig. 1 (b) System setup of the official examinations for the signal quality of the CATV systems in Taiwan at the users.

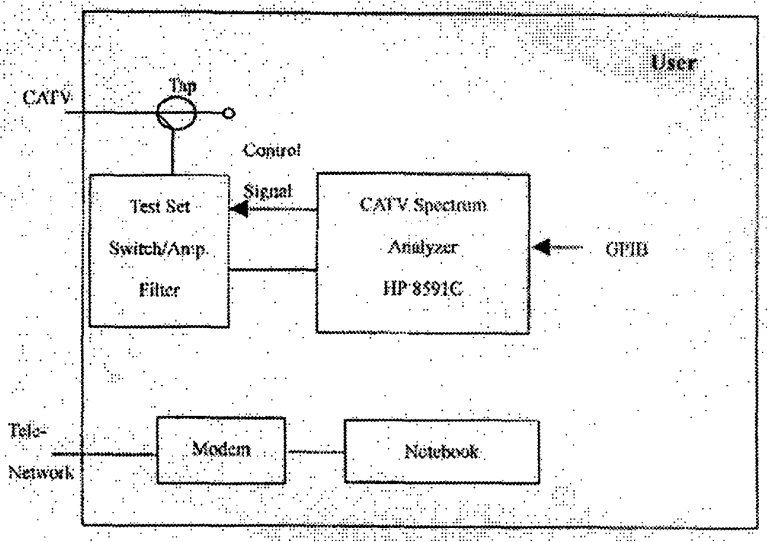

Fig. 2 Goal of this study to simplify the system setup at the users.

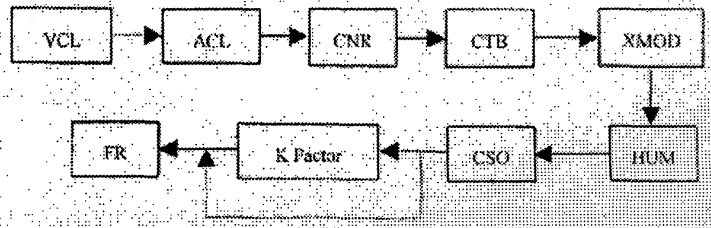

Fig. 3 Modify the file DLP.dat to skip the item of the K factor.