Graduate University for Advanced Studies –SOKENDAI-
National Institute of Informatics –NII-

AUTOMATIC ADAPTATION OF STREAMING DATA FOR WEBELS MEETING FOR LOW-SPEED INTERNET

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OUTLINE

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Introduction

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Date: October 2012
Graduate University for Advanced Studies (SOKENDAI)
Subject: WebELS system.
National Institute Of Informatics (NII)

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- Prof. Haruki Ueno
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Introduction

-WebELS Meeting is an online conference system that was developed for live video conference.

-Low Speed Internet:

> Delay of the voice

> Freezing of video during distance meetings between Japan and Algeria.

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WebELS OVERVIEW

-WebELS (Web-based e-Learning System) is a general purpose e-Learning platform designed for Higher Education in Science and Technology.

-“Anytime, Anywhere, Anybody”.

-WebELS is all-in-one system.

-WebELS offer advance authoring tool function to create personal content such as PPT, PDF, image, video, and so on in easy way.

-WebELS consists of two major modules: WebELS Learning and WebELS Meeting.

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WebELS Meeting

-WebELS Meeting is designed for online meeting conference system via Internet-based technologies.

-support the higher education for online learning activities, include several functionality such as content-authoring, online presentation, video conference and so on.

- It is Conference system don`t required high-speed Internet and a specific operating system.

WebELS Meeting operations

-Content authoring.
-joining meeting.

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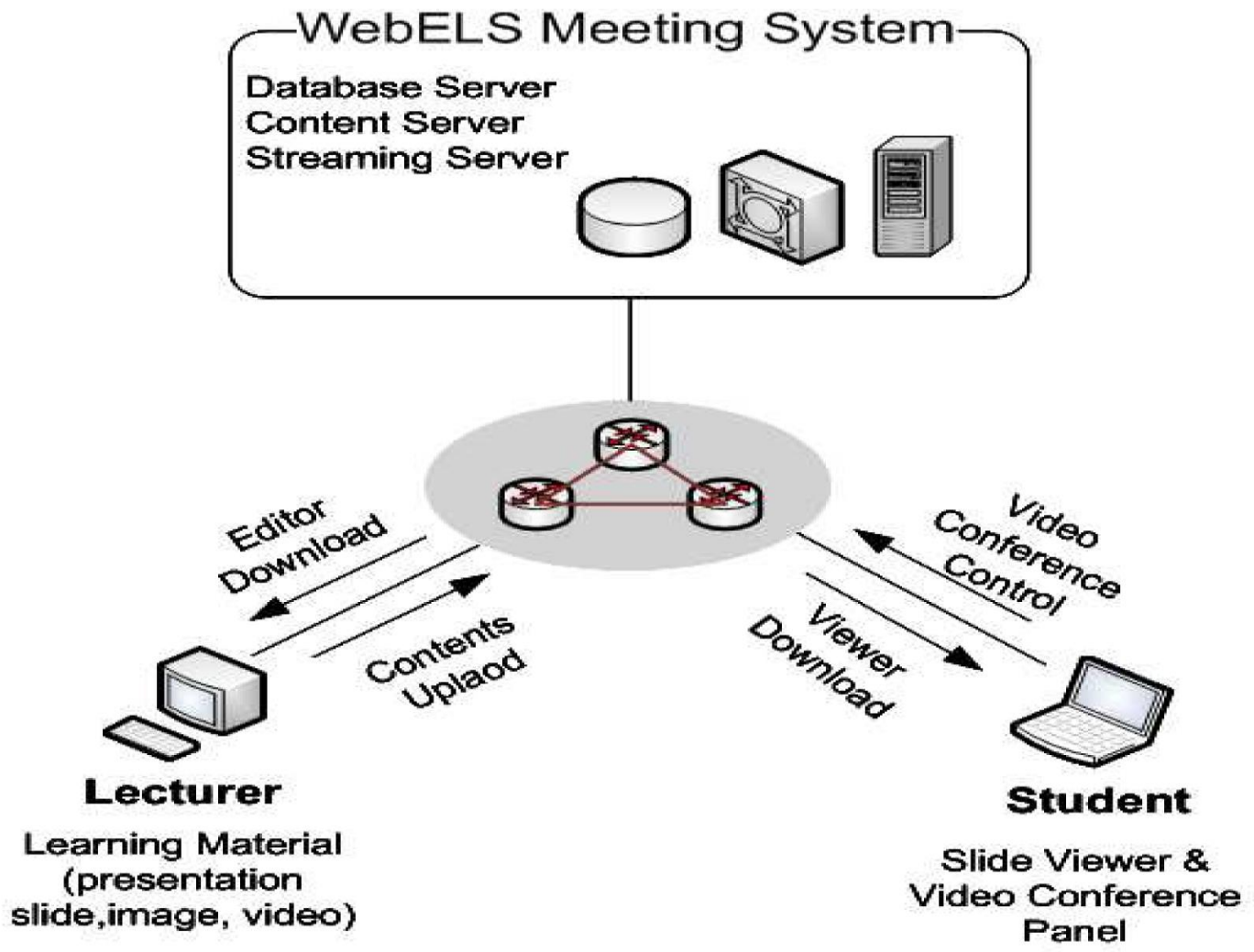

FIGURE 1. overview of WebELS Meeting

WebELS®
Web-based e-Learning System

Distribute Video & Presentation

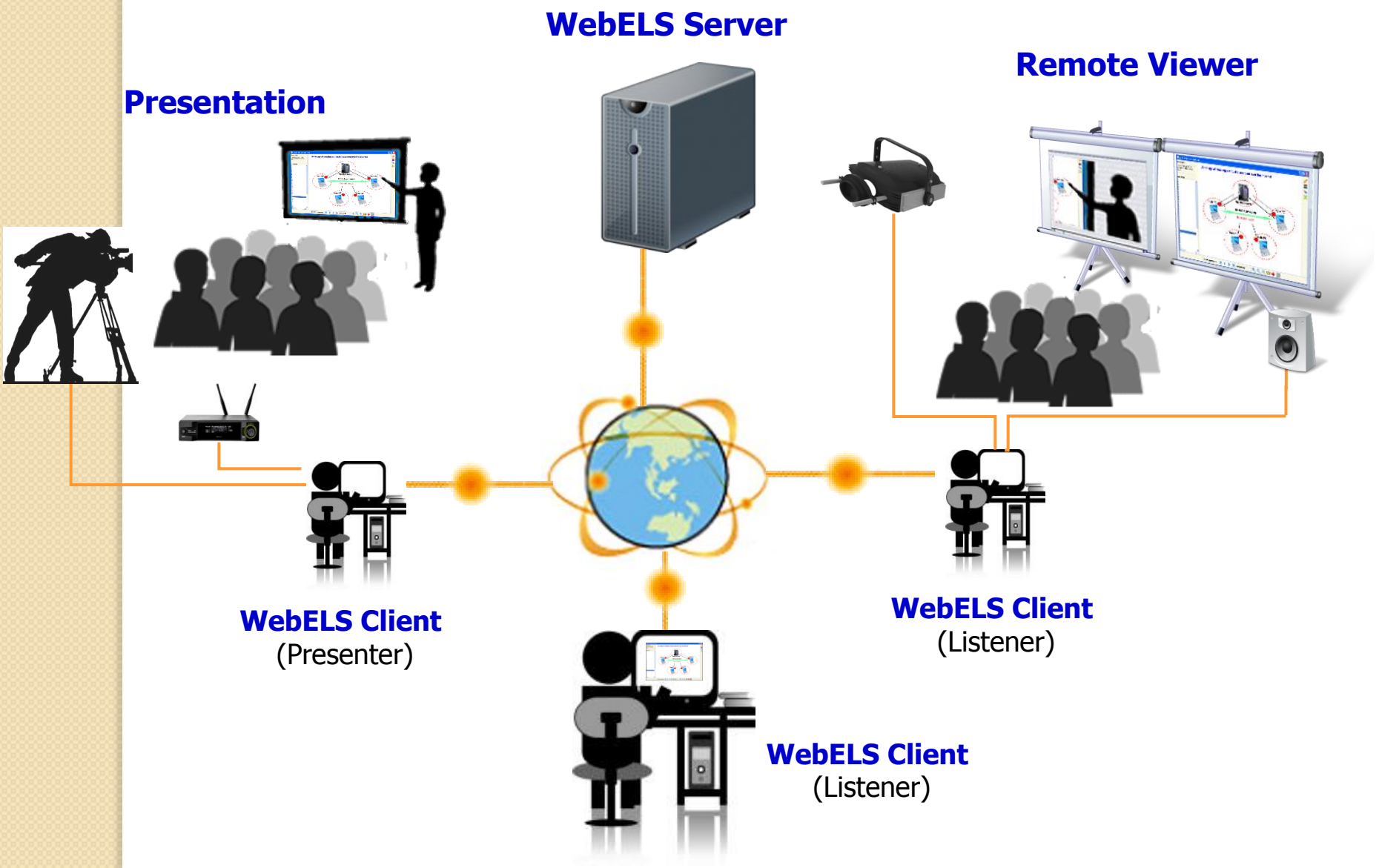

FIGURE 2. Example of E-Meeting between NII and USTO

FIGURE 3. Example of Video conference, Workshop 31/01/2012

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ISSUE

-Low-speed internet, specifically at developing countries.

-WebELS system is suitable to work under low-speed internet, but in case of unstable network the user can be confused with the freezing of the video and the delay of the voice.

-Problems during the previous meetings between Japan and Algeria.

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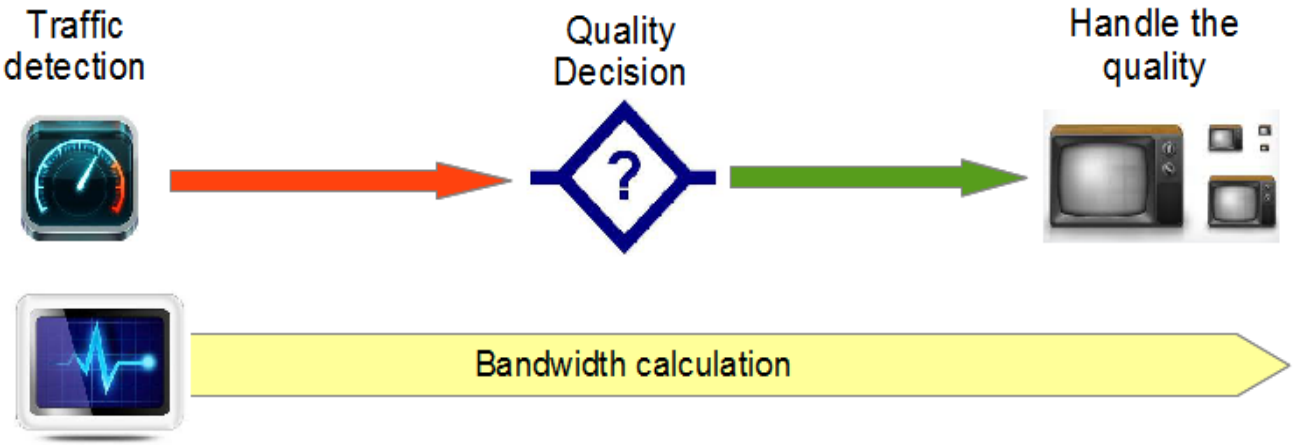
Proposed System

See the problems during the meetings between USTO and NII on the quality of the video and voice.

we proposed to added a new method to the meeting system, that can detect the bandwidth of the users automatically, and depend on the value of the bandwidth the system will provide different quality and display it for the user. That mean the system will adapt the streaming automatically during the meetings.

Video meeting quality adaptation



Automatic quality control workflow

- Keeping the suitable stream quality
- Reduce the network traffic

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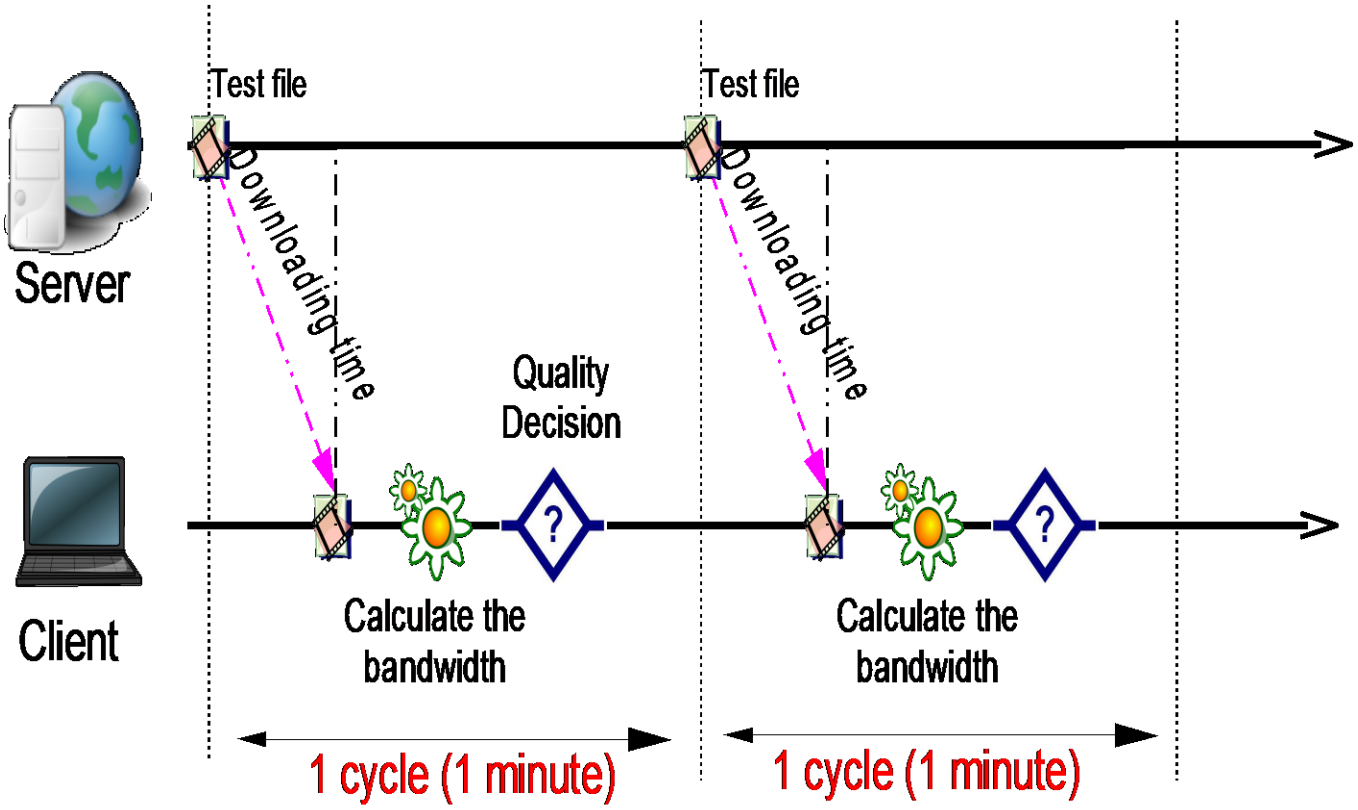

Figure 4 Methodology of the proposed system

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Method

We used three equations in orders to control the streaming data during the online meeting.
Equation (1) used to determine the size of the file downloaded from the server and to generate the total time of downloading.

Equation (2) to determine the value of the user bandwidth.

Filesize = bytestotal /Byte
Totaltime = (finishtime – starttime) /Second

Equation (1)

Bandwidth = filesize/totaltime
Bytes/second

Equation (2)

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In order to make the streaming adaptation more stable based on the bandwidth value, we decided to use the average bandwidth instead of real bandwidth in the time of every 30 seconds using equation (3).

$$\text{AvgBW (Kbps)} = \left(\sum_{i=1}^{5} BW\right)/5$$

Equation (3)

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Result and Discussion

-The new features in the E-Meeting system was designed based on functional standard WebELS Meeting version.

-We tested the new feature in a reel meeting between USTO and NII gave us an idea about the bandwidth at USTO.

-select the intervals of the video, audio quality requirement after simulation.

- In case of bad-internet, the system will automatically stop video and keep only voice.

this values are present in this table:

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Average Bandwidth	Meeting Quality
< 50 Kbps	Voice only
50 - 100 Kbps	Low quality
100 – 200 Kbps	Medium quality
> 200 Kbps	High quality

Table 1. Condition for quality decision

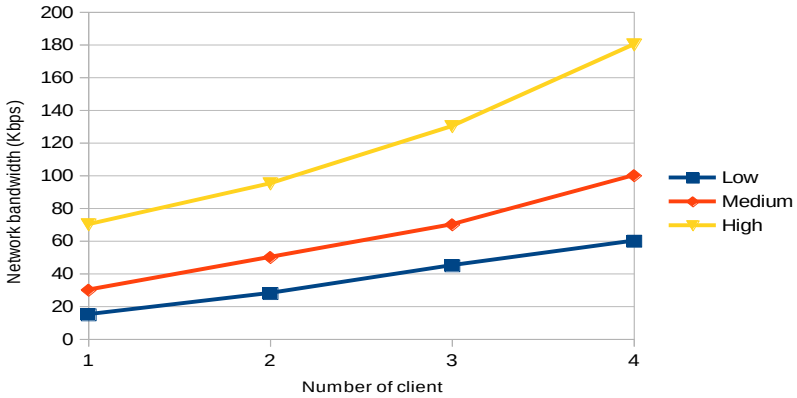

Figure 5. Average bandwidth for video meeting

Fig 5, shows the experimental results of the average bandwidth for video meeting. This value generated using equation (3), and give better adaptation of the streaming in an interval of time where bandwidth can be changed suddenly.

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Video streaming refinement

Streaming parameters	Streaming qualities					
	Low		Medium		High	
	Original	New	Original	New	Original	New
Video resolution (pixels)	320x240	160x120	320x240	320x240	320x240	640x480
Video compression rate (%)	70	50	40	50	20	30
Video frame rate (fps)	8	5	10	5	15	5
Audio sampling rate (kHz)	11	8	11	8	22	8
Audio bitrate (kbps)	32	12.8	32	12.8	64	12.8

Video and Audio setting parameters for each meeting quality

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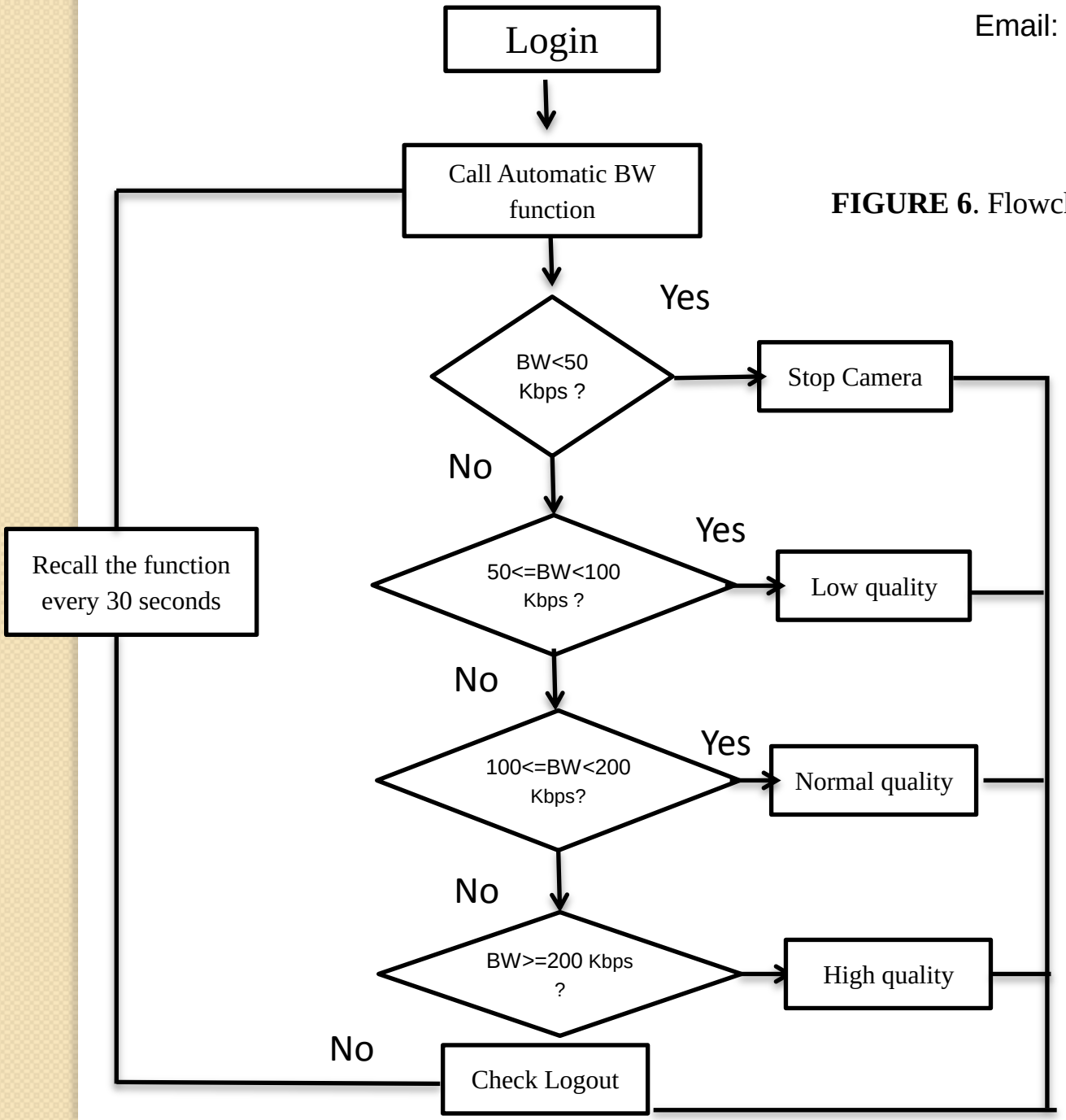

FIGURE 6. Flowchart of the Automatic decision

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-Currently a number of members are using the WebELS system to join meetings between USTO and Japan. The proposed system given as result better adaptation on the streaming data, this feature adjusted the video and voice levy rate automatically depending on the network traffic.

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Conclusion

The proposal system is for goal to improve the performance of the web-based online conference system when used in the low-speed network environment. Therefore, it can switch automatically from the video to voice mode for decreasing the transfer data streaming size in the network, so the system can control the quality during the user in meeting to avoid delay voice and freezing video.

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THANK YOU FOR LISTENING