

# Flood Forecasting through M2M Communication

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The technological news today always introduces new devices that involve m2m communication. M2M Communication is creating a sensation all over the world with its wide range of application in enterprise infrastructure management, healthcare, fleet management, forecasting weather and many more. The Department of Hydrology and Meteorology of Nepal in collaboration with Real Time Solutions Pvt. Ltd. have also merged the M2M communication and internet for forecasting flood along Narayani Basin. It introduces a new device called M2Mlite which are SCADA based system suitable for any monitoring and controlling.

M2Mlite is a first of its kind emblem incorporating sophisticated technology for data acquisition and telemetry. You not only have the advantage of acquiring data at real time but also have a full fledged system data storing, archiving and retrieving. The most appealing feature of M2Mlite is that it is a small device meant to do big things. It comes with its own datalogger and a communication unit for CDMA/GSM communication. A backup battery ensures communication even when power supply is limited. If for any reason data is not being posted on the internet it can be manually retrieved through SD/MMC card or PC interface.

Recently M2Mlite has been used in the Real Time Data Acquisition System for Forecasting Flood along Narayani Basin. It has been installed in 10 different sites along with various sensors for monitoring rainfall intensity and water level. M2Mlite simply communicates the sensor readings to a database server via CDMA modem over the internet.

## **How data is collected and sent from M2Mlite**

All sensors have a certain output e.g. the water level sensor gives out a 2 bit digital output in grey code format which is interpreted by the datalogger to data packets to be sent through the modem. These data packets have information on the date and time the data packets are sent, the device id or the station along with the sensor output. This data is stored on an EEPROM by the data logger. The system then checks the connection with the modem once the modem is ready it sends the data from the EEPROM to the server. In case the modem isn't ready it keeps checking for the connection to be cleared and sends the data again. Thus, the data is transmitted without any loss. In case there is any communication error the same data can be retrieved by inserting an SD/MMC card in the M2Mlite where the data is downloaded automatically.

## **Turning data into information**

The data sent from M2Mlite to the server uses AES (Advance Encryption Standard) for secure communication between the server and M2Mlite so that no information is leaked in between. The

server side scripting decodes the AES encryption, represents the data into readable formats and stores it into the database according to the respective fields.

### **Representing data**

The main advantage of posting the data over the internet is the flexibility in the programming languages that can be used to represent the data. The Web 2.0 facilitates programmers to create web-based application from php, javascripts, .NET, AJAX, etc.. creating dynamic websites with limitless features desired by the user. Another main advantage in using web-based application is that it requires less hardware resources and is compatible with any OS. It makes it easier to give the information to general public in real time. The information can be restricted, open or semi-private as required.

### **Monitoring and control**

The M2Mlite not only communicates the data from the sensor but also gives information on its status. It also sends information on the ADC, DAC outputs, voltage level and other parameters so that the user can know if the device is functioning properly. This makes it easier for users in debugging in remote areas.

M2M communication has unimaginable possibilities waiting to be discovered. It is also a cheaper solution for ongoing processes of data entry through personnel which is a constraint on budget and man power. The data for the Real Time Data Acquisition System for Forecasting Flood is communicated at 10kb per 0.0115 paisa which is the cheapest solution so far. With flexible hardware and software solution M2Mlite can be a powerful M2M communication tool for data acquisition and telemetry. The future of communication is here and will only progress.