

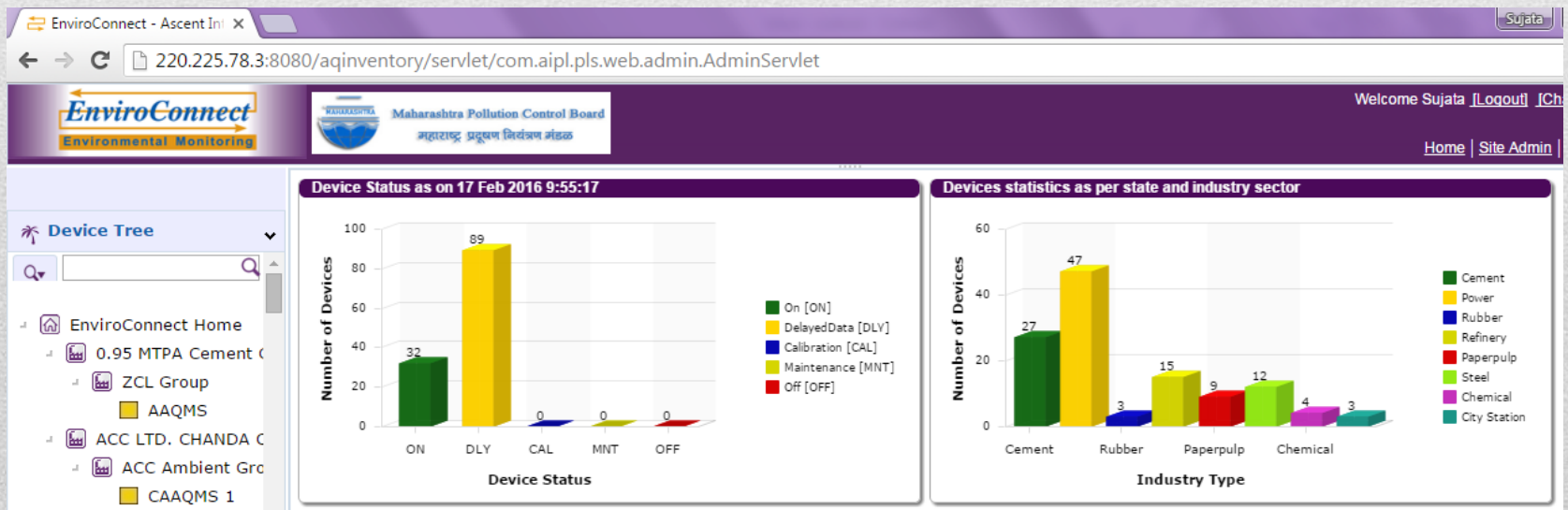
# DATA ACQUISITION, RECORDING AND TRANSFER SYSTEMS

- Dr. Arvind Tilak,  
CEO, Ascent Intellimation

# CPCB requirements

- Focus on data from stationery sources of pollution mainly industrial establishments
- Air data from
  - Stack emissions
  - Ambient stations
  - Weather stations
- Mandatory data transfer for 17 industrial sectors like steel, cement, power
- Permissible limits based on industry type
- Each vendor is required to put up a server
- Data acquisition directly from measuring instruments and real time transfer to CPCB server

- States like Maharashtra and Telangana have opted for an aggregated server while some states are asking vendors to put up a server
- Data is required to be shared with the SPCB server in parallel to sharing with CPCB server
- Permissible limits as specified in the consent to operate letter



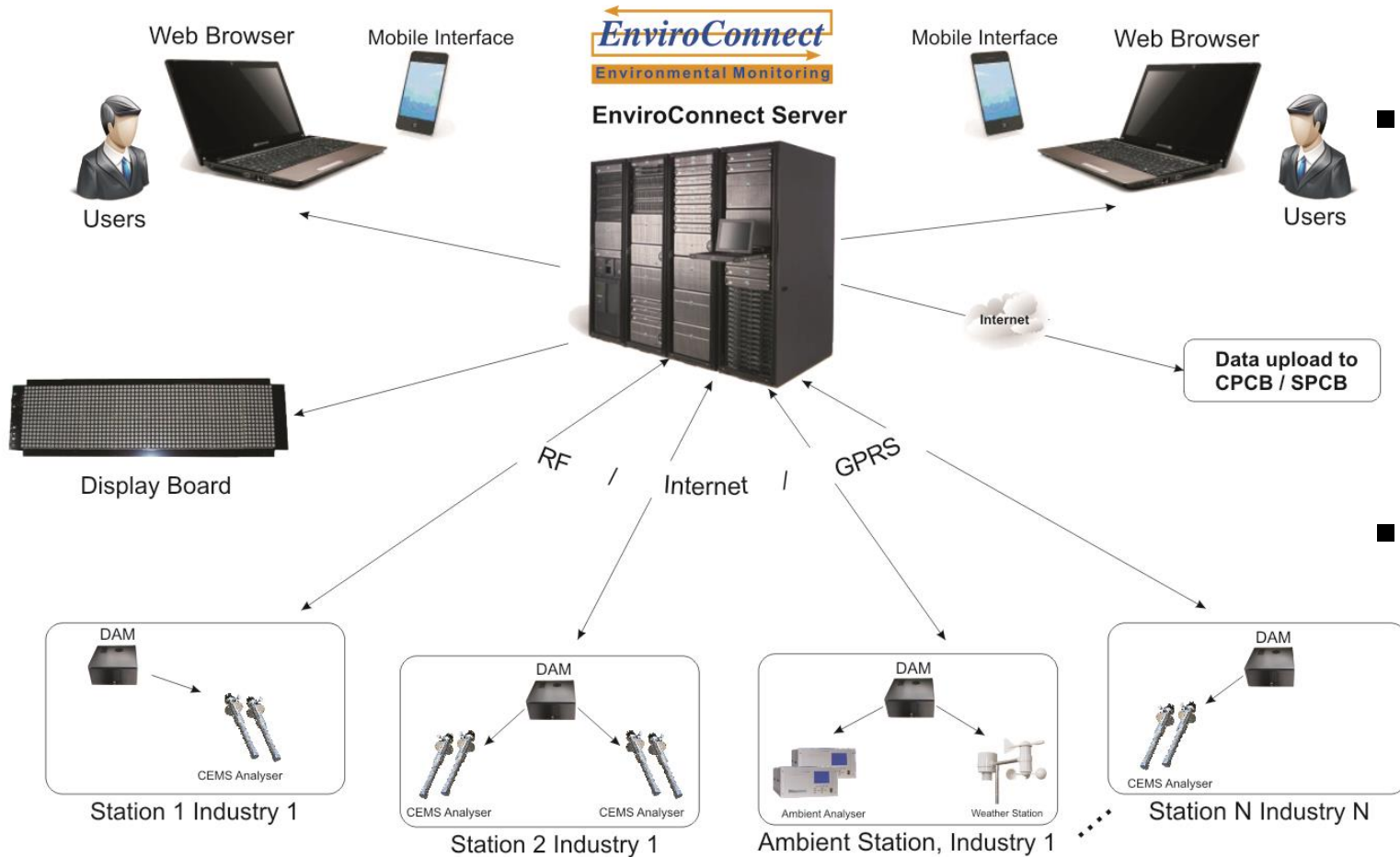
# DAHS Characteristics

- Ability to collect data from instruments of different makes and models and aggregate it on a central server
- Both online and offline data collection capability
- Ensuring proper upkeep (maintenance and calibration) of instruments so that data measured is accurate
- Ensuring continuous and reliable data availability
- Ability to validate, analyze and present data in meaningful ways
- Easy to deploy site infrastructure, e.g. site hardware should not require real IP

# DAHS Characteristics

- *Accessible*
  - From *anywhere, anytime* (24 x 7)
  - *Browser based*
  - *From PC, tablet, mobile*
- *Open and Transparent*
  - A common system for industries, vendors and regulators
  - All actions right from station registration, calibration data recording to data collection, validations, audits are via this system and hence visible to respective stake holders
  - Transparent data validation procedures between data providers and Regulators
- *Scalable*
  - Scalable from a few stations to a few hundred stations

# Architecture



- Data In

- DAM
- Via API
- Via Files

- Data Out

- Local
- SPCB
- CPCB

# Helping regulators

- Create transparency and deterrence
- Automate regulatory tasks
  - Data validation and replacement
  - Industry engagement → exceedance alerts, enforcement of calibration
- Regulation by exception
  - In this concept, system should monitor all data received and only alert concerned users about exceptional events
  - The events are exceedance of permissible limits, instrument malfunction, data not received for certain period, calibration not done for certain period etc.,
  - SMS / email to vendors, station operator and regulators
- Well defined workflows for extra ordinary events

Alarm Information							
<small>Note:- * represents mandatory field</small>							
*Alarm Name	NOX Alarm	*Type	Simple Conditional				
*Alarm text	*Alarm Severity	Send SMS	*Mobile Number	Send E-Mail	*E-Mail Address		
NOX limit exceeded	Critical	<input checked="" type="checkbox"/>	+919960305151, +91	<input checked="" type="checkbox"/>	CRT@aiplindia.com		
*Evaluation Method	Average	*Periodicity	24	Hour	No Of Occurrences		
Logical Condition OR							
Condition			Relational Condition List				
*Variable	*Operator	*Limit	>>	Variable	Operator	Limit	
NOX	<			NOX	Geater than equal to	80	✖

# Challenges

Collecting  
data from  
devices of  
different  
makes and  
models

Creating an  
Open and  
Transparent  
System

Ensuring  
**Reliability,**  
**Quality** and  
**Availability** of  
data



# Addressing challenge

Collecting data  
from devices of  
different  
makes and  
models

- Install a Data Acquisition Module (DAM) on site
- DAM communicates with analyzer using supported protocol and acquires data in real time
- Publish a Server API using which any third party client can send real time data to server
- File based communication
  - Real time
  - Periodic

# Data characteristics

- **Data reliability/ quality** – depends on sampling method, analyzer condition (regular calibration etc.), method of transfer to server (online without manual intervention, manual etc.)
- **Data availability** – How much data is available in the given period and whether it is enough for analysis

# Addressing challenge

Ensuring  
reliability,  
quality and  
availability of  
data

- **Reliability**
  - *Real time data collection thru DAM without any intervention*
  - *Two time stamps – measurement time and server receipt time*
  - *Encrypted storage on server*
- **Availability**
  - *Set % validity to ensure data is representative*
  - *Proper handling of availability issues like internet connection down, DAM or server down etc.*

# Addressing challenge

Ensuring  
reliability,  
quality and  
availability  
of data

- **Quality**
  - *Quality flags for each data item. Some flags are*
    - *Bad data*
    - *Data under scrutiny*
    - *Permissible range exceeded*
    - *Calibration / maintenance*
    - *Delayed data*
    - *Validated / Corrected data*
  - *Enforcement of periodic calibration of analyzers*
  - *Check on quality of calibration itself*
    - *Validate data during calibration*
    - *Store calibration range on server and ensure data within the range*
  - *Data validations protocols (DVP), data replacement protocols*
    - *Zero, negative value check*
    - *Constant value check, ceiling check*
    - *Step change check*
    - *Missing data*

# Addressing challenge

Creating an  
Open and  
Transparent  
System

- *Open and Transparent*
  - A common portal for industries and regulators
  - All actions right from industry registration, calibration data recording to data collection, validations, audits are via this portal and hence visible to respective stake holders
  - Transparent data validation procedures agreed between data providers and Regulators