

Ratan Das, Senior Principal Engineer, Distribution Automation, March 27, 2013

# Future of Distribution Automation

## i – PCGRID Workshop – 2013

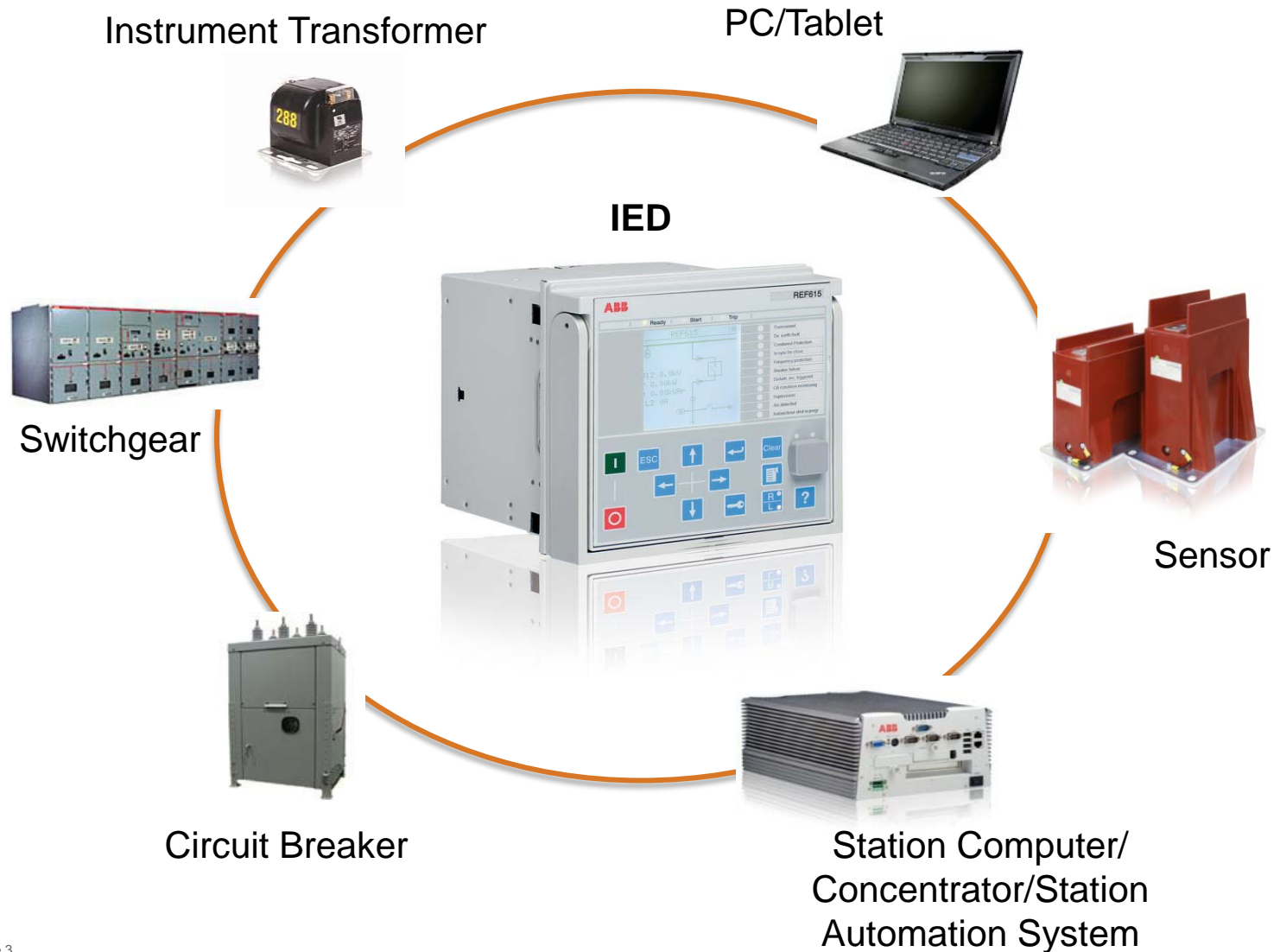
San Francisco, CA, USA

March 26-28, 2013

# Introduction

- Towards Centralized Substation Protection and Automation
- Use of Sensors
- Use of GPS in Asset Management

# IED Interfaces



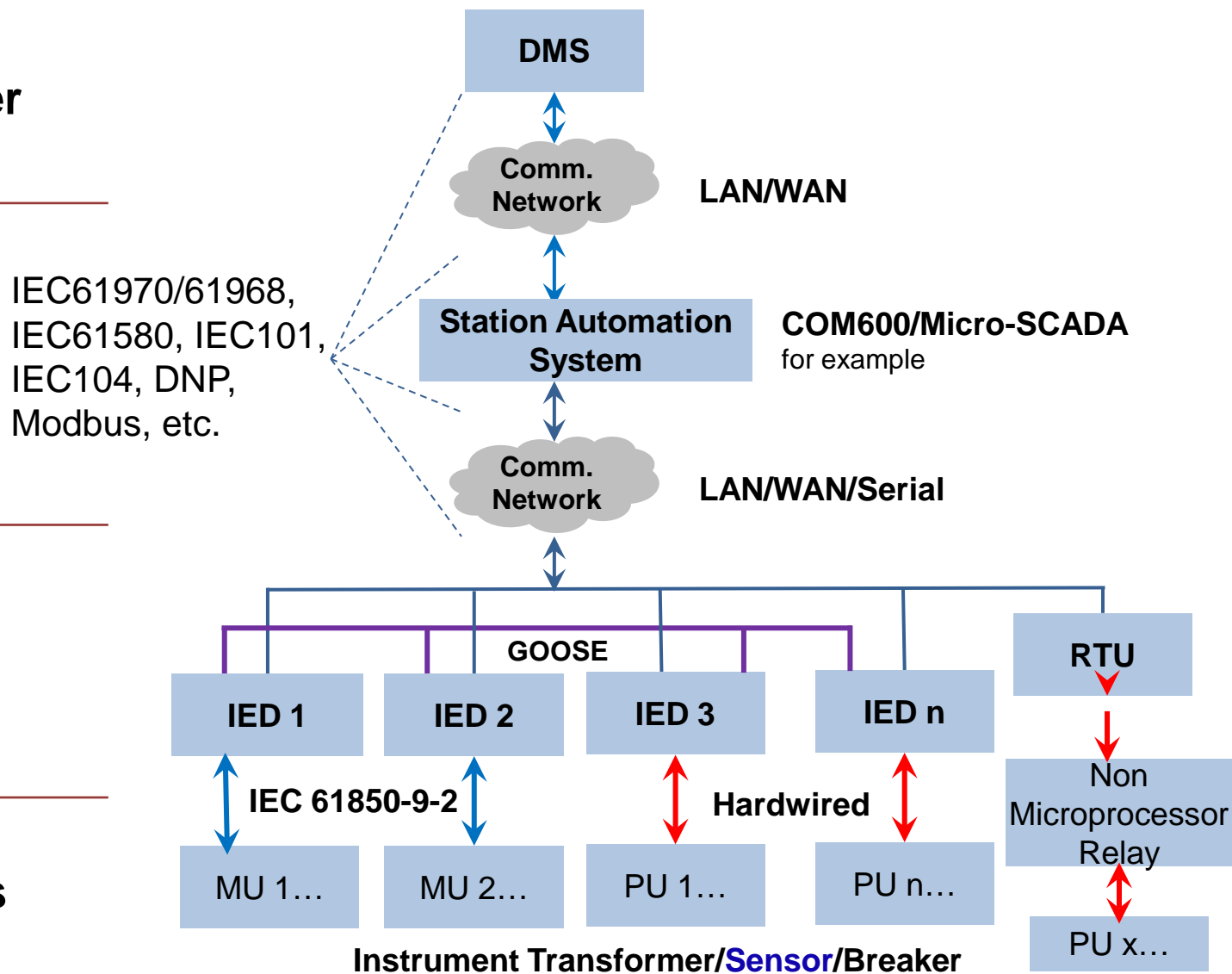
# Distribution System 1

## Control Center

## Substation

## Bay

## Process Units



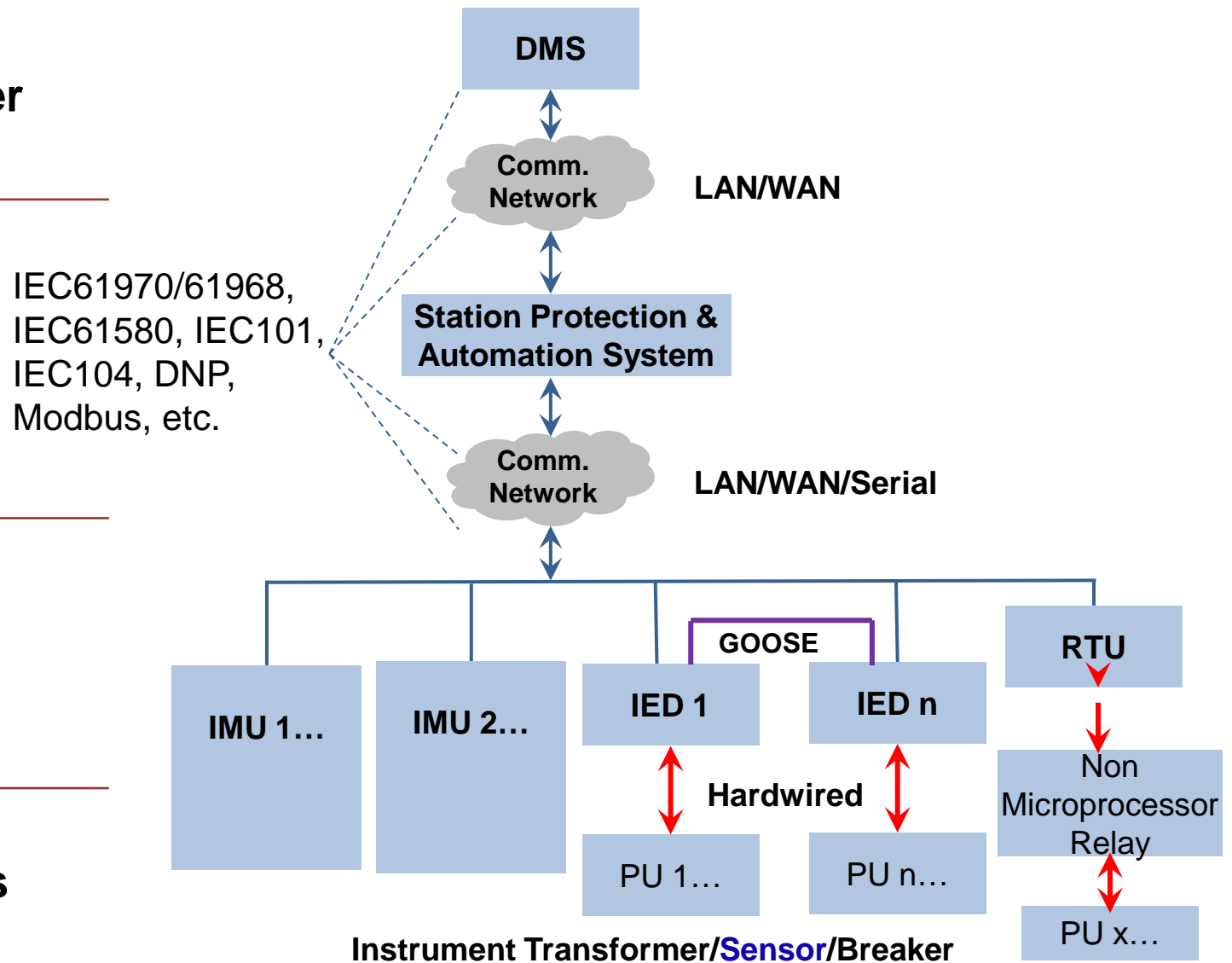
# Distribution System 2

## Control Center

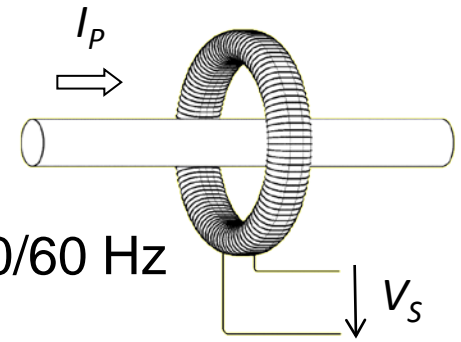
## Substation

## Bay

## Process Units



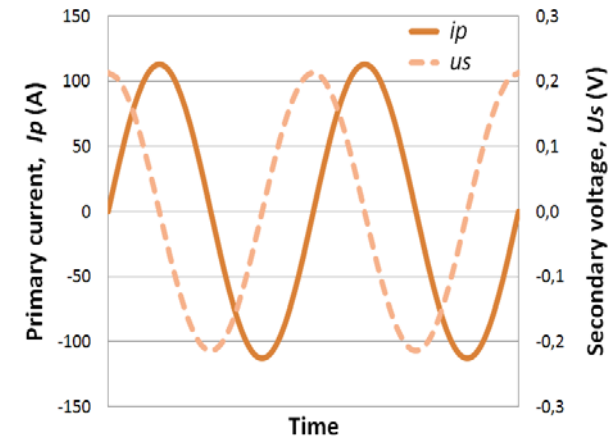
# Current Sensor in MV Applications



- Rated Ratio 250A/150mv or 180 mV for 50/60 Hz
- Rated burden 10 M $\Omega$
- 6-24 kV AIS, up to 1250 A
- Accuracy class 0.5/5P630 (KEVCD A)
- Small size and low weight
- Extremely low power consumption
- Minimize sources of partial discharge
- No saturation of current sensor
- Secondary circuit of current sensor could be left opened – no risk of high voltage on secondary terminals, great for IEDs
- KEMA certified as per IEC 60044-8

$$v_s(t) = M \frac{di_p(t)}{dt}$$

KEVCD A



# Voltage Sensor in MV Applications

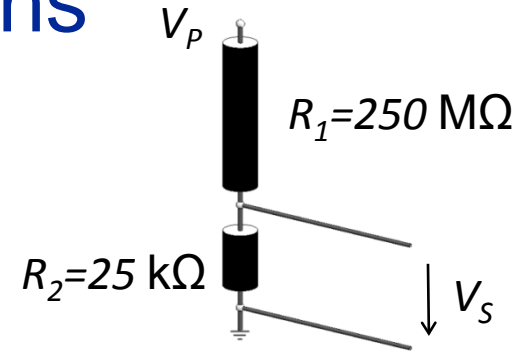
KEVA 24A1



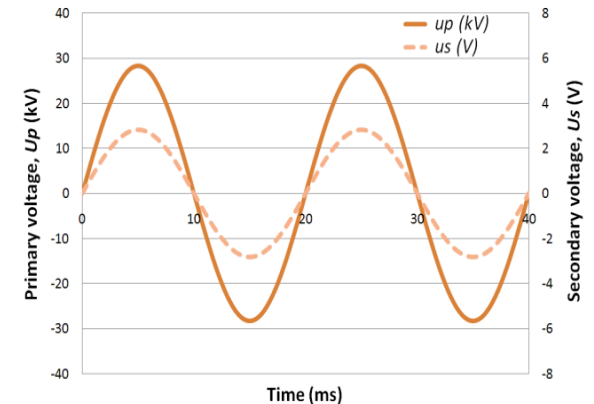
KEVA 24A2



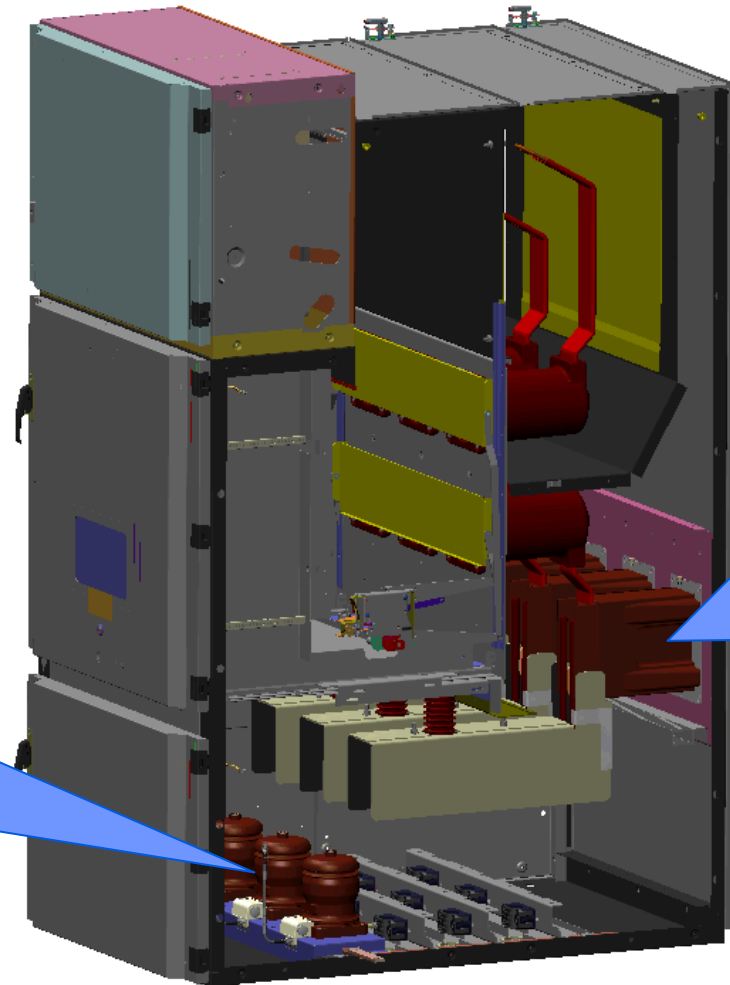
- Rated Ratio 1:10,000
- Rated burden 10 MΩ
- 6-24 kV AIS
- Rated voltage factor : 1.9/8hours
- Accuracy class 1/3P (KEVA 24A1) or 0.5/3P (KEVA 24A2)
- Small size and low weight
- Extremely low power consumption
- Minimize sources of partial discharge
- No risk of Ferro-resonance
- Secondary circuit of voltage sensor can be left shorted – no risk of explosions, great for IEDs
- KEMA certified as per IEC 60044-7



$$V_S = \frac{R_2}{R_1 + R_2} V_P$$



# UniGear™ Air Insulated Switchgear



KEVA sensors



KEVCD sensors





# Possible Use of GPS in Asset Management

- GPS use possibility in IED (**Requires standardization in the industry**)
- Circuit breaker (operation counter, fault current, partial discharge)
- Transformer and motor (fault current, oil/winding/ambient temperatures)

Device	Serial Number	IP Address	Latitude	Longitude	Time	Circuit ID	Max current	Max Demand	-
REF615	1VHR91032101	99.22.888.11	37.792715	-122.397057	13/03/27/14/20/05/220	BW-13	228	3055	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
REF615	1VHR91032101	99.22.888.11	37.792715	-122.397057	13/02/11/14/10/03/223	BW-13	233	3076	-
REF615	1VHR91032101	99.22.888.11	37.792715	-122.397057	13/01/25/10/10/04/100	BW-13	150	2070	-
REF615	1VHR91032101	99.22.999.22	37.780755	-121.966631	13/01/15/15/23/17/423	BW-13	150	2070	-
REF615	1VHR91032101	99.22.999.22	37.780755	-121.966631	13/01/15/14/20/23/379	ABCDE	480	6624	-
REF615	1VHR91032101	10.63.181.66	26.285450	-80.286133	13/01/04/11/10/22/151	ABCDE	480	6624	-
REF615	1VHR91032101	10.63.181.66	26.285450	-80.286133	13/01/04/11/05/15/171	ABCDE	0	0	-

Use

Production

yr/mo/day/hr/min/sec/msec

Customization

Power Up

Power Down

# Summary

- Future of Distribution Automation
  - Towards Centralized Substation Protection and Automation
  - Use of Sensors
  - Use of GPS in Asset Management

# For Additional Information or Discussion

## Contact:

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