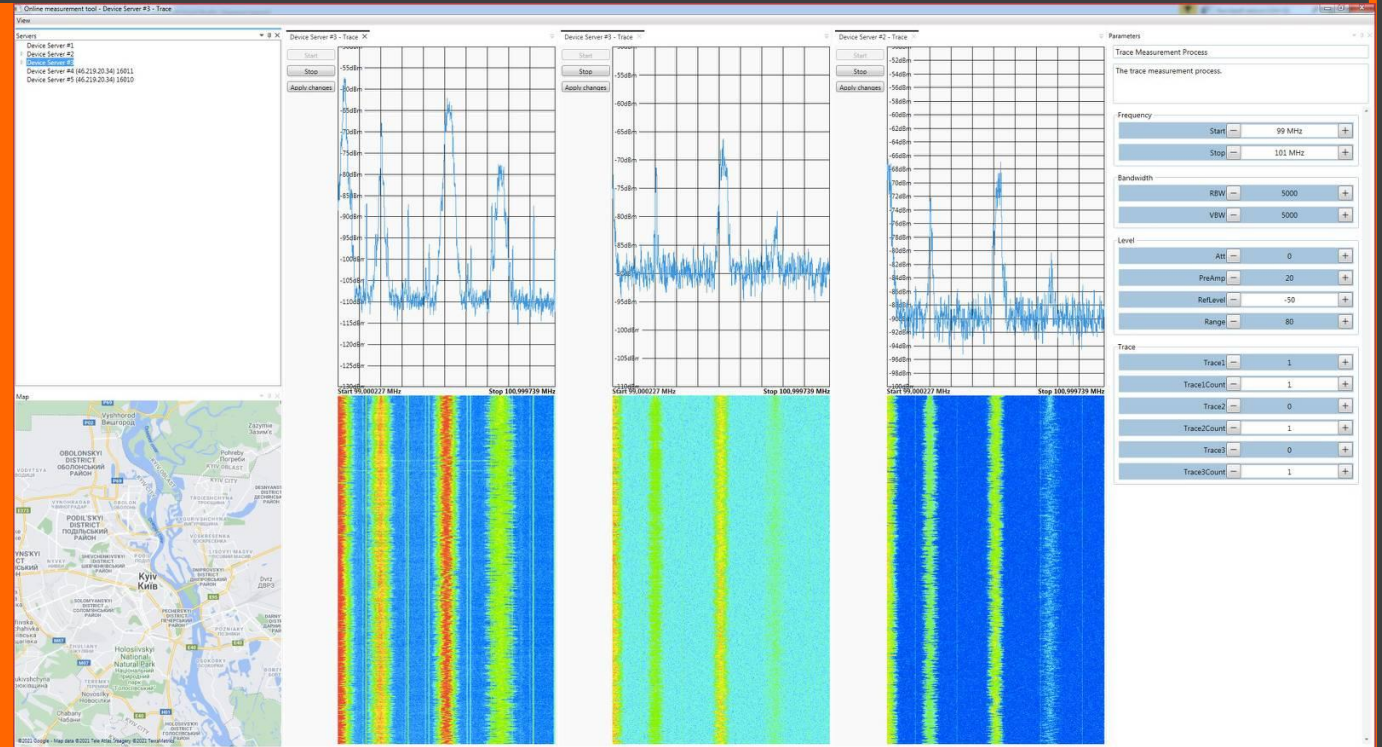


**ICS MONITORING –  
SDRN CONTROL  
MULTI-TASK SPECTRUM  
MONITORING  
SOFTWARE BASED ON  
A SERVICE ORIENTED  
PLATFORM**



# SPECTRUM MONITORING SOLUTION BASED ON A SERVICE - ORIENTED PLATFORM

## KEY BENEFITS

- ONE SINGLE SYSTEM GATHERING:
  - SPECTRUM MANAGEMENT AND INVENTORY DATA - **ICS MANAGER**
  - MEASUREMENTS - **ICS MONITORING/SDRN CONTROL**
  - EMISSIONS ANALYSIS BASED ON INVENTORY AND MEASUREMENTS - **HTZ**
- MULTITASK MEASUREMENTS
- INDEPENDENCY FROM MEASUREMENT EQUIPMENT
- MULTITHREADING IN MEASUREMENT DATA PROCESSING
- REPEATED USAGE OF MEASUREMENT DATA TO OBTAIN THE NECESSARY INFORMATION
- FLEXIBILITY AND SCALABILITY
- AUTOMATIC POST-PROCESSING OF MEASUREMENT RESULTS

# ICS MONITORING/SDRN CONTROL FORMS PART OF ATDI SPECTRUM MANAGEMENT SYSTEM


## ATDI SPECTRUM MONITORING & MANAGEMENT SYSTEM

**Spectrum monitoring**

Spectrum monitoring data

Complaint  
Inspection  
Monitoring  
Localization  
Identificatio

ICS MONITORING/  
SDRN CONTROL




**Workflow & Data management**

Spectrum management data

Notification,  
Coordination,  
Licensing &  
Billing  
Frequency plan;  
Allocation

ICS manager

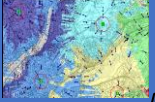


**Technical analysis**

Digital maps


Coverage  
Interference  
Assignments  
Traffic, EMC

HTZ



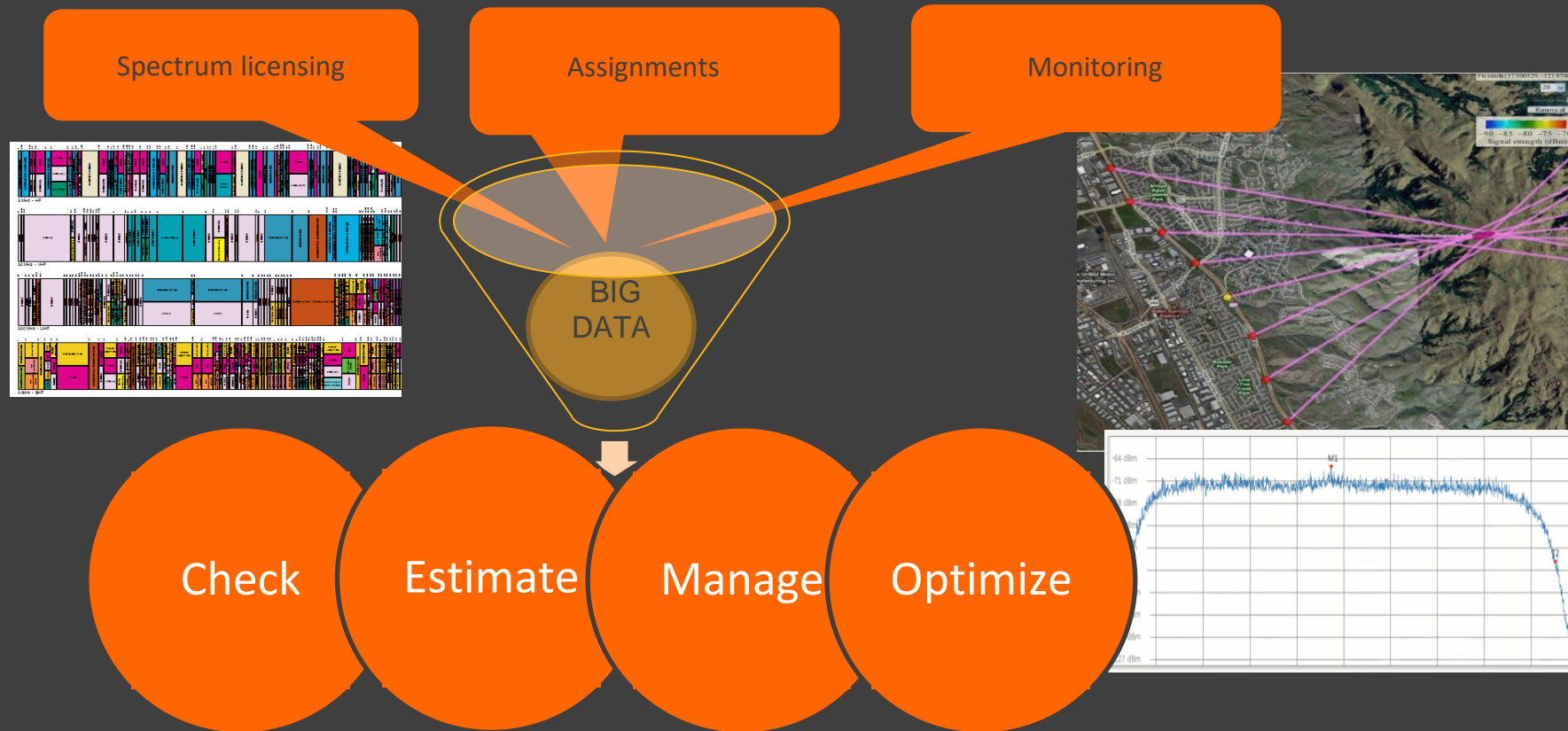
WEB Query service

WEB Portal,  
WEB API,  
WEB service...



# ICS MONITORING/SDRN CONTROL FORMS PART OF ATDI SPECTRUM MANAGEMENT SYSTEM

## GATHERING BIG AMOUNT OF DATA FROM VARIOUS SOURCES



# ICS MONITORING/SDRN CONTROL

## MAIN FUNCTIONS

### WORKING PRINCIPLES

### READINESS TO PERFORM TASKS IN ACCORDANCE WITH THE RADIO REGULATIONS

- CHECKING COMPLIANCE WITH THE CONDITIONS OF ASSIGNMENT OF FREQUENCIES
- FREQUENCY BANDS USAGE / CHANNELS OCCUPATION
- STUDY OF INTERFERENCE CASES
- SEARCH FOR UN-AUTHORISED EMISSIONS
- LOCALISATION OF EMISSIONS



INSPECTION

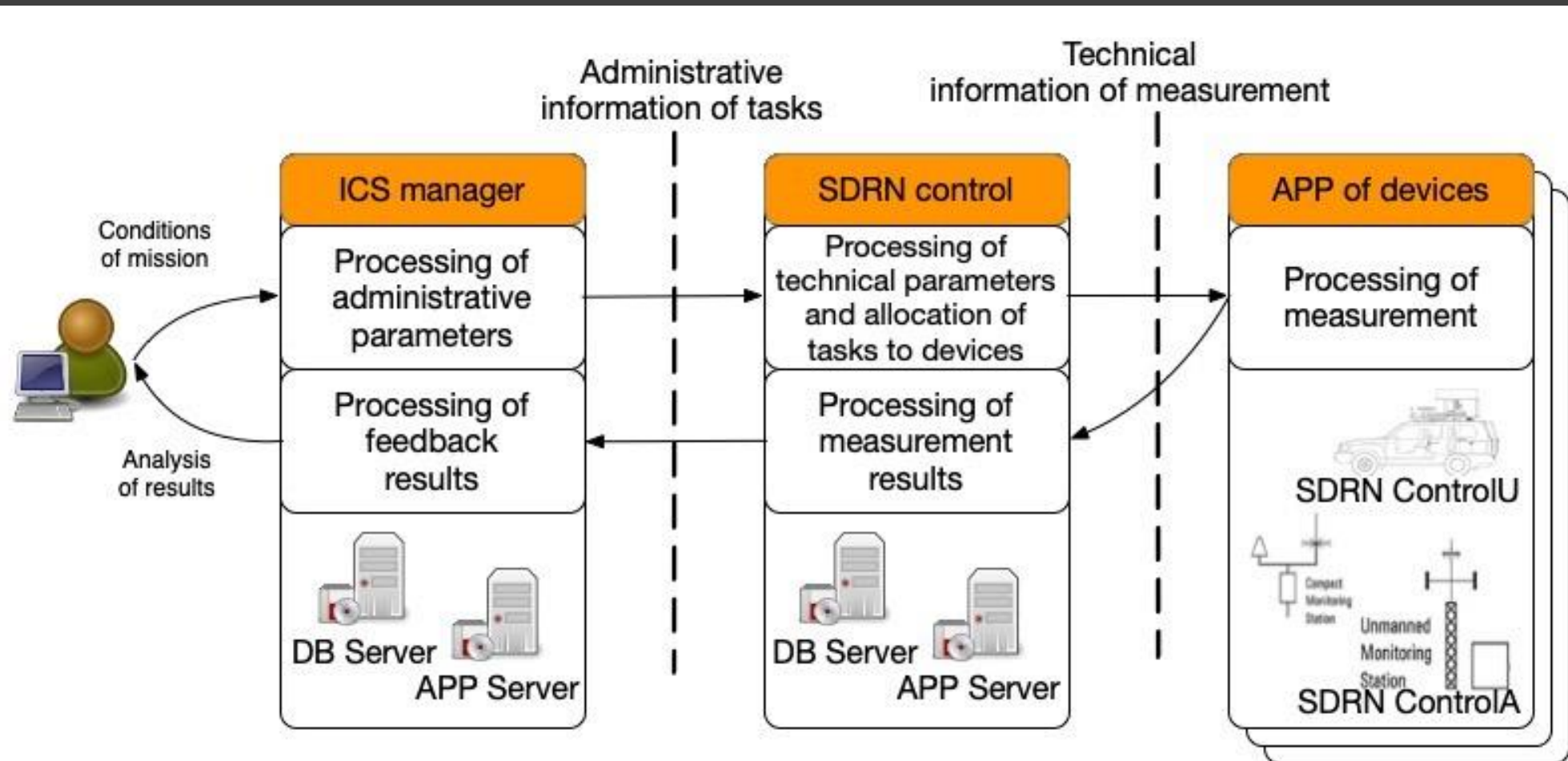


MONITORING



SPECTRUM EFFICIENCY

# ICS MONITORING/SDRN CONTROL: MAIN FUNCTIONS INTEGRATION WITH SMS ICS MANAGER INTEGRATED WORKFLOW



# ICS MONITORING/SDRN CONTROL CLUSTERED MODE ARCHITECTURE

## ICS MONITORING/SDRN CONTROLS (SDRN CS) – CLUSTERED MODE

- APPLICATION SERVER
- CENTRALIZED DATA PROCESSING
- SUPPORT FOR WORK OF MEASUREMENTS MANAGEMENT SERVICES
- ANALYSIS OF MONITORING RESULTS

## ICS MONITORING/SDRN CONTROL SERVER AGGREGATION (SDRN CSA)

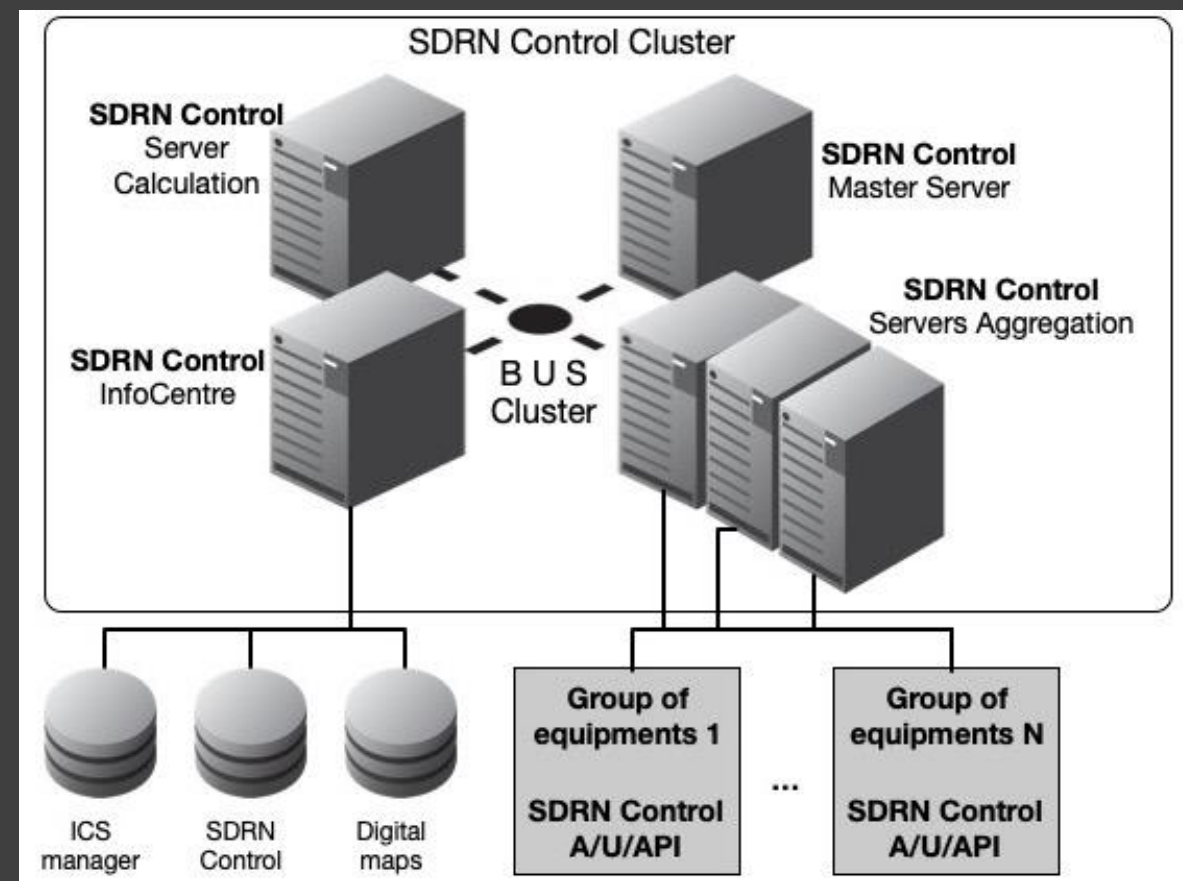
- SOFTWARE MODULE FOR LOAD BALANCING POINT INTO CLUSTER

## ICS MONITORING/SDRN CONTROL SERVER INFO CENTRE (SDRN CSI)

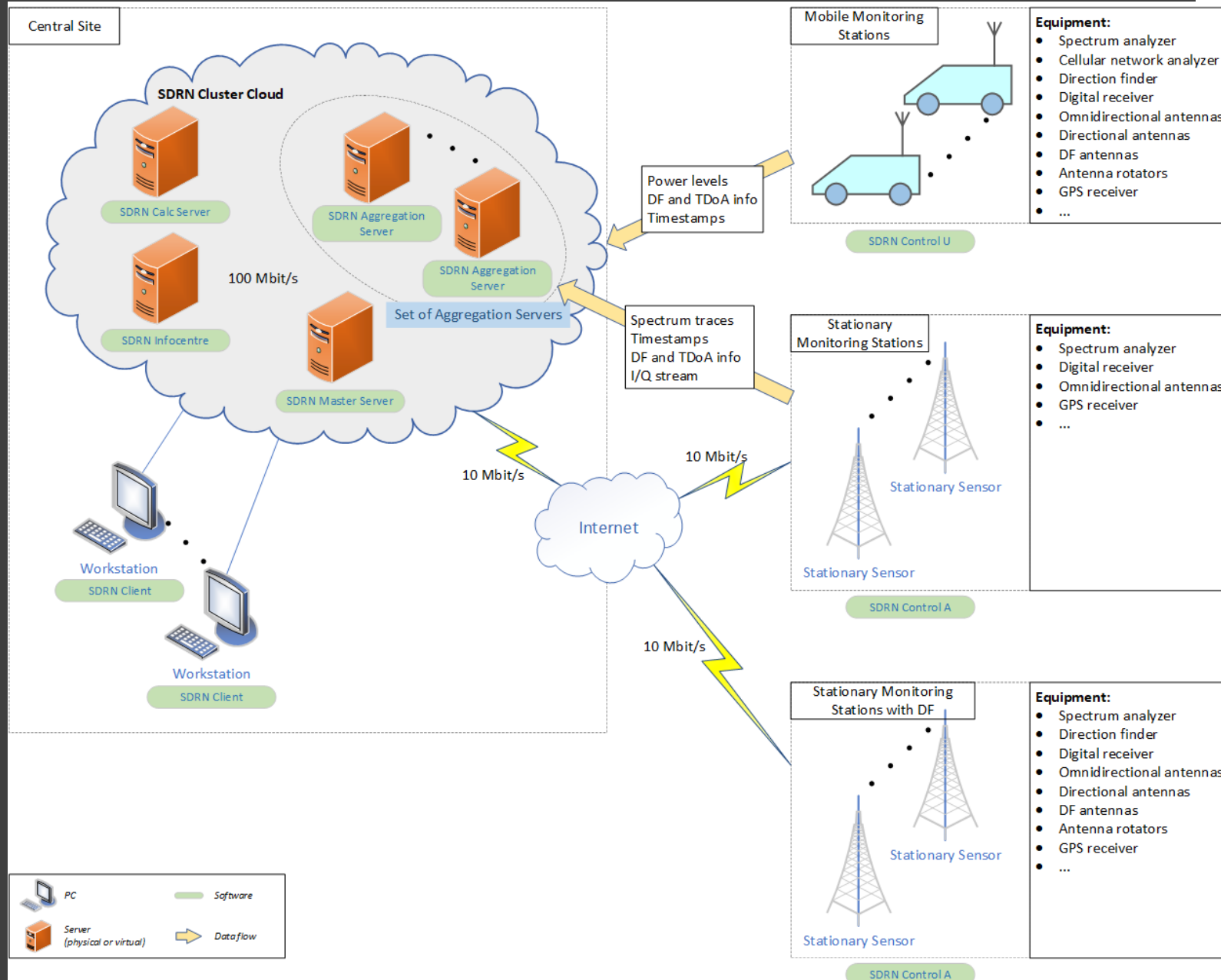
- SOFTWARE MODULE FOR HIGH PERFORMANCE DATA ACCESS BETWEEN DIFFERENT SOURCES WITHIN CLUSTER

## ICS MONITORING/SDRN CONTROL SERVER CALCULATION (SDRN CSC)

- SOFTWARE MODULE FOR HIGH PERFORMANCE MASSIVE COMPUTING BY PROPAGATION MODELS



# ICS MONITORING/SDRN CONTROL PHYSICAL ARCHITECTURE





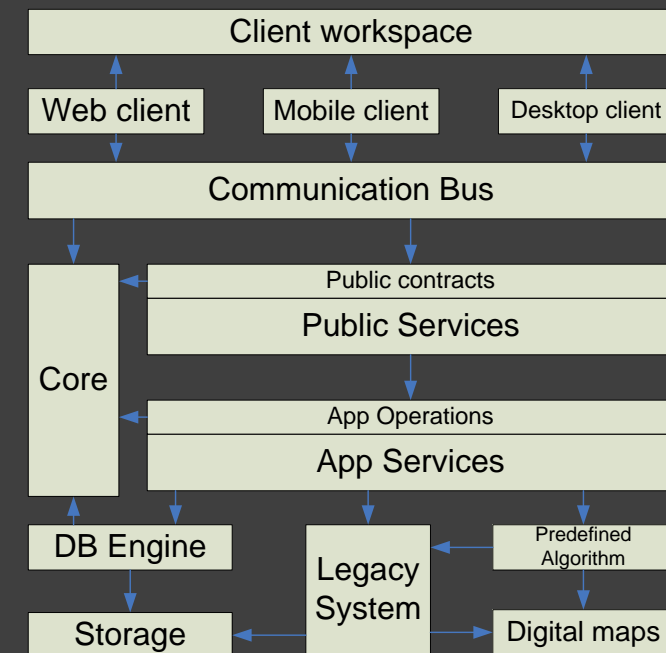
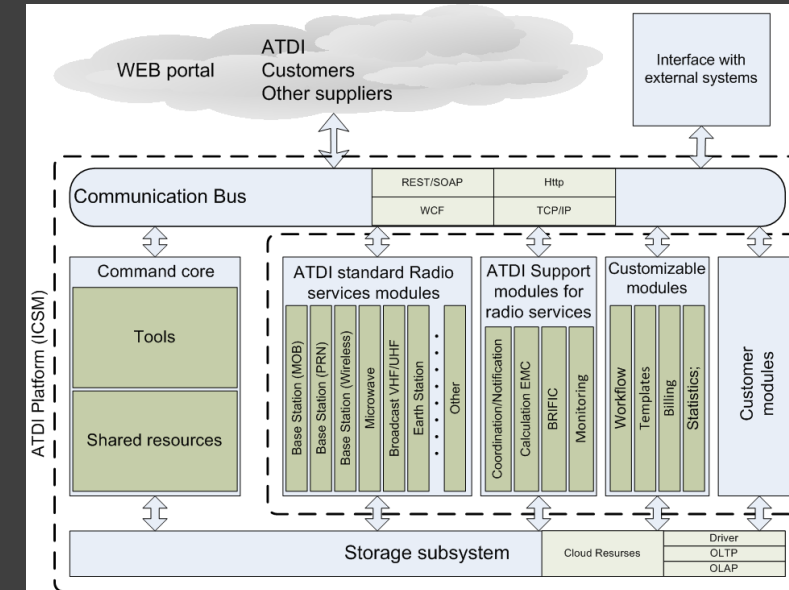
# ICS MONITORING/SDRN CONTROL A PLATFORM BASED ON A SERVICE ORIENTED ARCHITECTURE

## SOA ARCHITECTURE:

- **COMMAND CORE** — CONTAINS INSTRUMENTAL SERVICES TO MANAGE APPLICATION SERVERS
- **SERVICE MODULES** THAT ARE COMPONENTS OF SUBJECT-MATTER LOGIC WHICH CAN BE DISTRIBUTED
- THE **COMMUNICATIONS BUS** IS AN INTERMEDIATE LAYER PROVIDING CONNECTIVITY BETWEEN ALL SERVICE MODULES AND THE CLIENT

## TYPICAL LOGICAL STRUCTURE FOR SERVER-BASED SOLUTIONS WITH THE FOLLOWING KEY LAYERS:

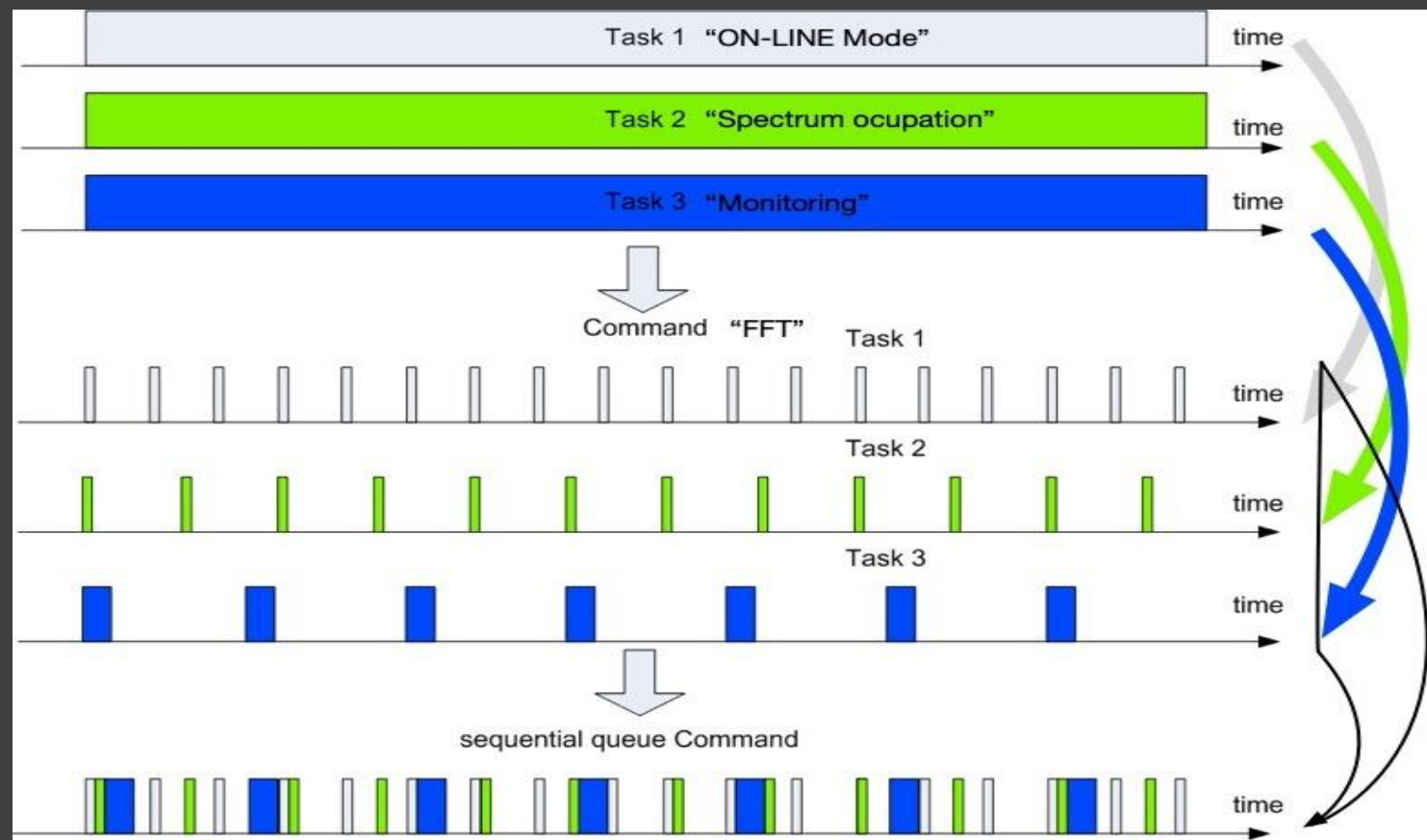
- **PUBLIC SERVICES** - A SELECTION OF COMPONENTS FOR THE WCF / REST SERVICES
- **APP OPERATIONS** - A SET OF COMPONENTS FOR IMPLEMENTING INTERFACES FOR USER-DEFINED FUNCTIONS
- **CORE** - AN APPLICATION SERVICE FOR MANAGING COMPONENTS HOSTING AND PUBLISHING DI (DEPENDENCY INJECTION) CONTAINERS



# ICS MONITORING/SDRN CONTROL HIGH PERFORMANCE MEASUREMENTS

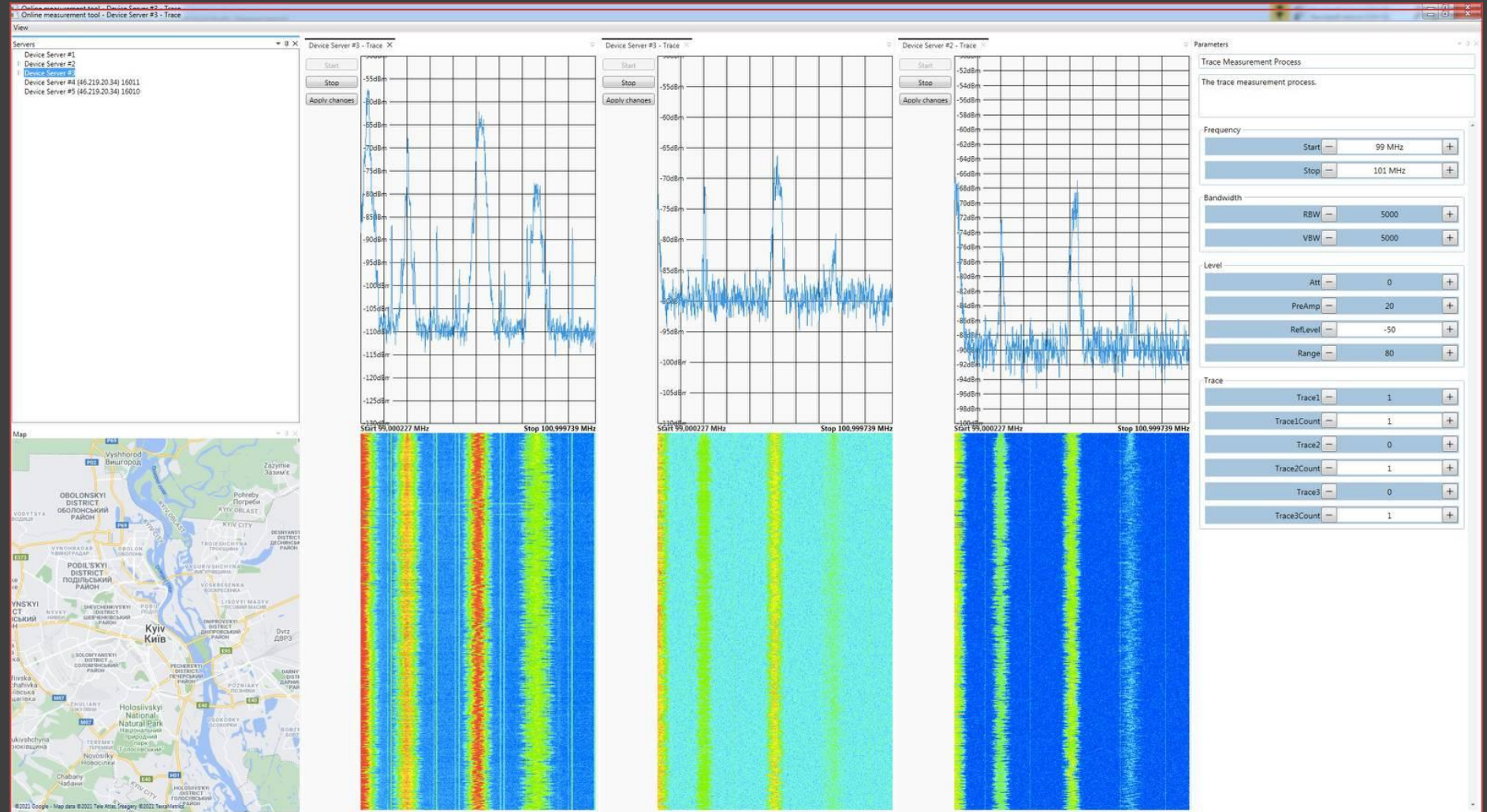
## ICS MONITORING/SDRN CONTROL A MULTI - TASK ENGINE

- APPLICATION LEVEL:**  
 USER TASKS THROUGH A FRIENDLY INTERFACE, BUT NOT STRUCTURED/SCHEDULED
- LOGICAL LEVEL:**  
 FFT OF A USER TASK TO LAUNCH A SET OF LEVEL MEASUREMENTS
- MEASUREMENT LEVEL:**  
 CONVEYOR OF COMMANDS WHICH ARE STRUCTURED IN TIME, FREQUENCY PLAN AND PRIORITY



# ICS MONITORING/SDRN CONTROL: HIGH PERFORMANCE MULTITASK MEASUREMENTS

- ONLINE DISPLAY OF SEVERAL DEVICES SIMULTANEOUSLY
- TRANSFORMING A SINGLE CHANNEL RECEIVER IN A MULTIPLE CHANNELS ONE



<https://www.youtube.com/watch?v=m2yjexC5d4o>

# Thank you!

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