

# DBBT

Digital Broadcasting &  
Broadband Technologies

Co-funded by the  
Erasmus+ Programme  
of the European Union



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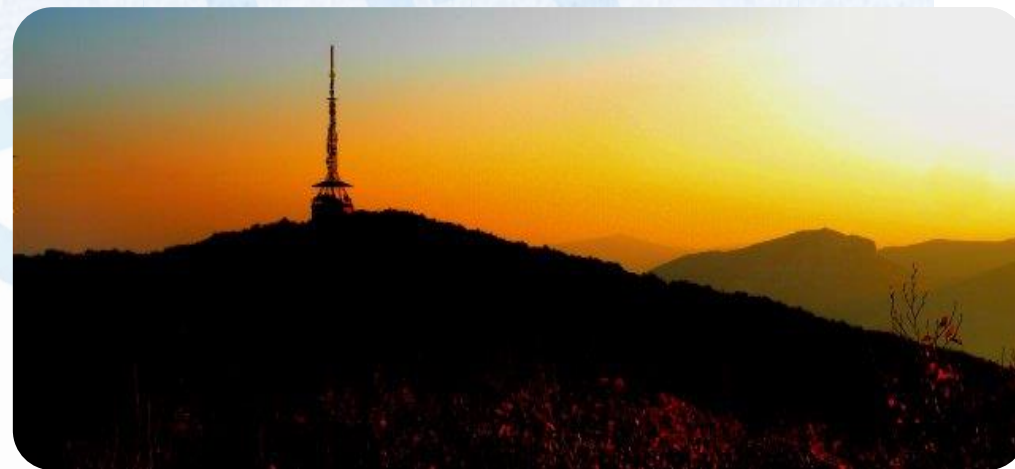


DBBT Teacher Training, ETV – VISER - Singidunum



## Topics of Lectures

- **Head End**
- **Measurement**
- **Avala tower**
  - **TV and Radio transmitters**
  - **Antenna System**
  - **Power Supply**





# Topics of Lectures

- Head End

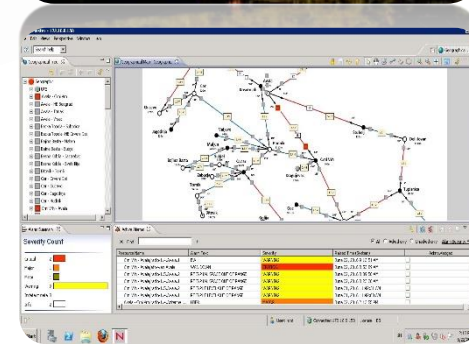




## Topics of Lectures

The following topics were addressed during Teachers training, held on 09. and 10. march 2018:

- National Head End (coding, encoding, multiplexing, gateway, transport stream, equipment, contribution and distribution of Radio and TV signals)
- Micro Wave links (Indoor and Outdoor Unit, Interface Unit, GIC (Gigabyte Interface and Controller Unit) and RIU (Radio Interface Unit), Type of Modulation, Adaptive Modulation, Network capacity, redundancy, QoS – Quality of Service)
- NMS – Network Management System – CISCO ROSA, NetMaster, Umbrella
- R&S GUI – Remote Access to transmitters





## Topics of Lectures

- **Measurements**



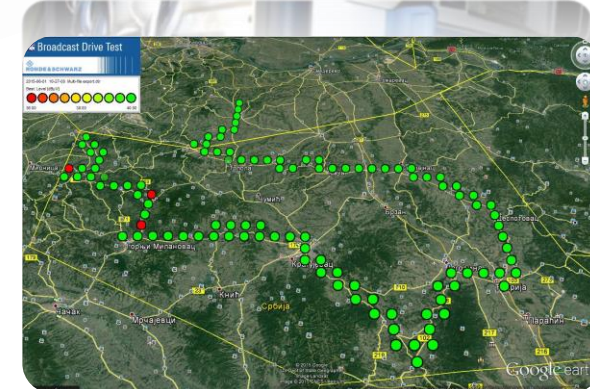


## Topics of Lectures

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### MEASUREMENT

- Measurement laboratories – measurement equipment's: R&S ETL TV Analyzer, R&S FSU TV Analyzer, R&S ETH TV Analyzer, R&S SFE Broadcast tester, R&S ZVB Vector Network Analyzer, Promax and Rover measurement portable device
- Measurement vehicles – Land Rover for mobile measurement - Equipped by R&S ETL TV Analyzer, BC Drive Software tool, Romes Software Tool, Kathrein measurement antenna and GPS Receiver and Mahindra for stationary Measurement Equipped by R&S ETL TV Analyzer, Promax HD+ Field Strength Meter, Clark Mast – 10 meters, R&S Measurement Antenna HL033 and HL233
- R&S BS Drive software for measurement purposes





## Topics of Lectures

- **Avala Tower**
  - **TV and Radio**
  - **Antenna System**
  - **Power Supply**





## Topics of Lectures

The following topics were addressed during Teachers training, held on 09. and 10. march 2018:

### TV and Radio transmitters

- FM Radio Transmitters – air cooled, rigid line, patch panel
- DVB-T2 Transmitters – DVB-T2 System (MER, BER, GI, CR, SISI/MISO, FFT, FEC), COFDM modulation, Doherty architecture, Combiner, Network Planning Parameters, SFN and MFN Network, Echo cancelation, Constellation Diagram, Radio in DVB-T2
- HbbTV, HEVC, UHD TV, 2k/4k, DVB-T2 Lite, IoT,
- DAB+ system – HE AAC ver.2, Hybrid radio







## Topics of Lectures

The following topics were addressed during Teachers training, held on 09. and 10. march 2018:

### Antenna System

- Fider, coaxial cables, rigid lines, Power splitters
- Combiner, patch panel
- UHF Antenna System
- VHF Antenna System
- FM Antenna System

### Power Supply

- UPS 600 kVA
- Diesel Engine 3 x 400 kVA



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**Thanks four your attention!**