

Digitalni radiodifuzni sistemi i tehnologije

Digitalni TV prijemnici

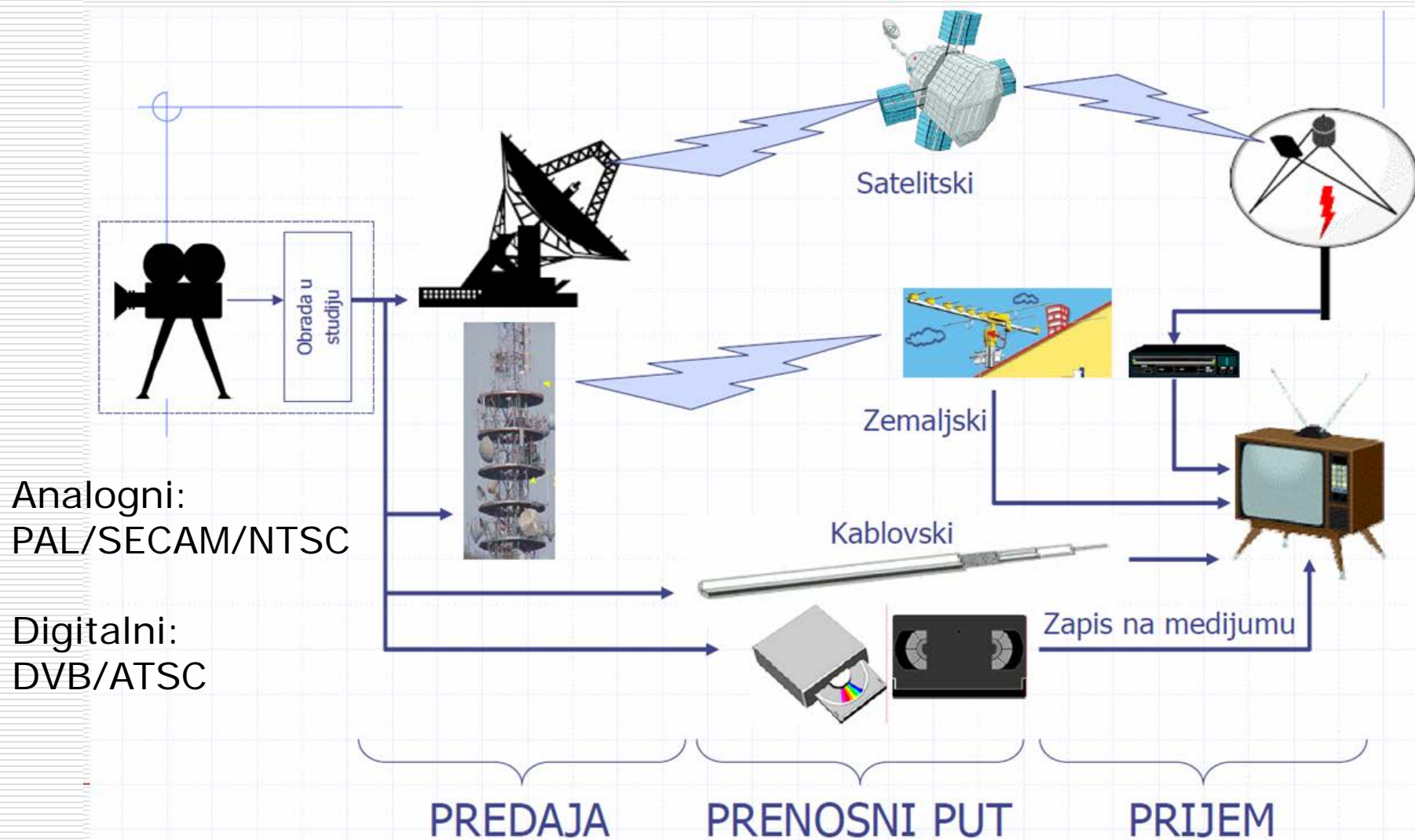
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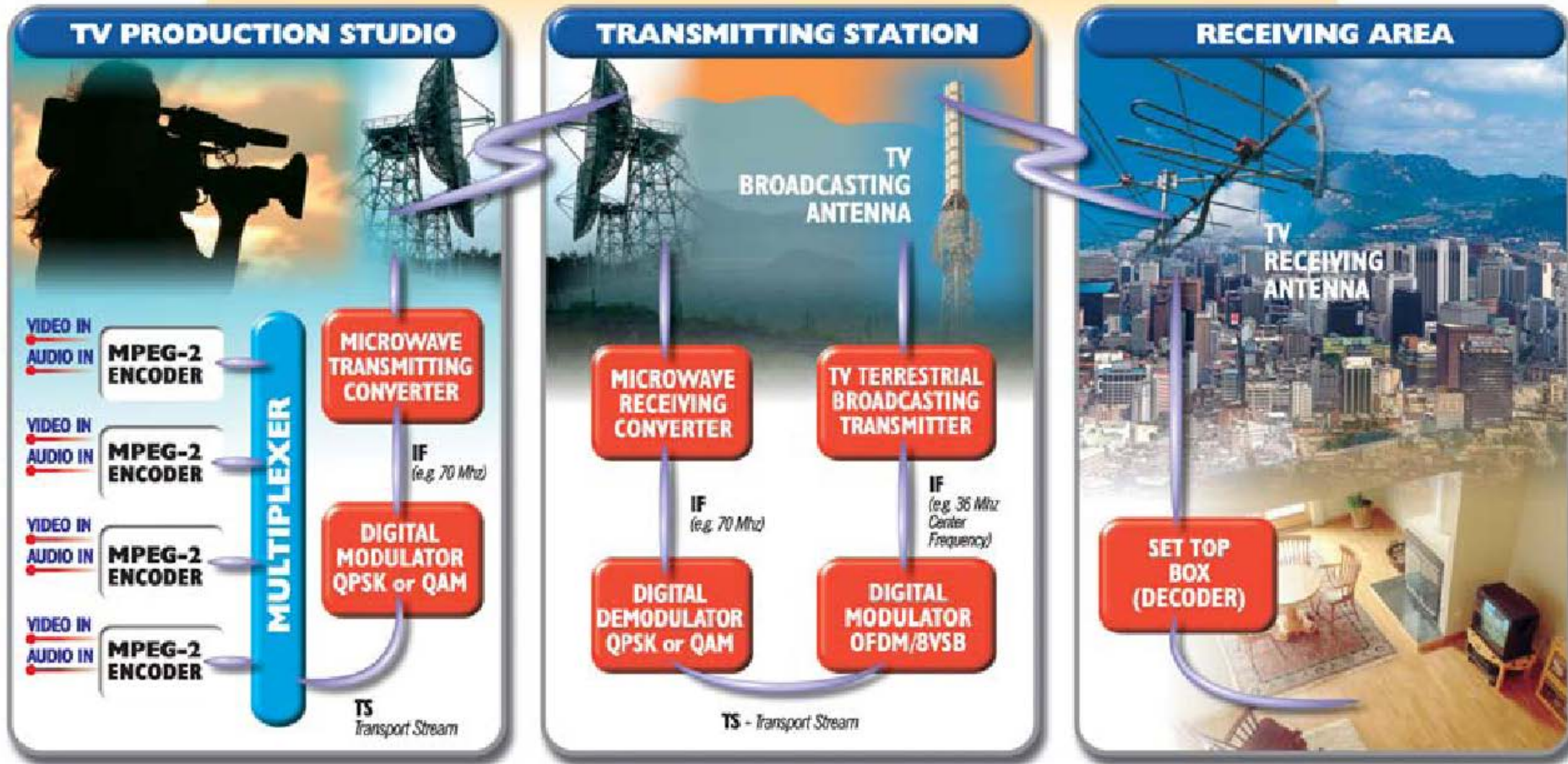
Elektrotehnički fakultet Banja Luka

Banja Luka, 2017.

TV sistem



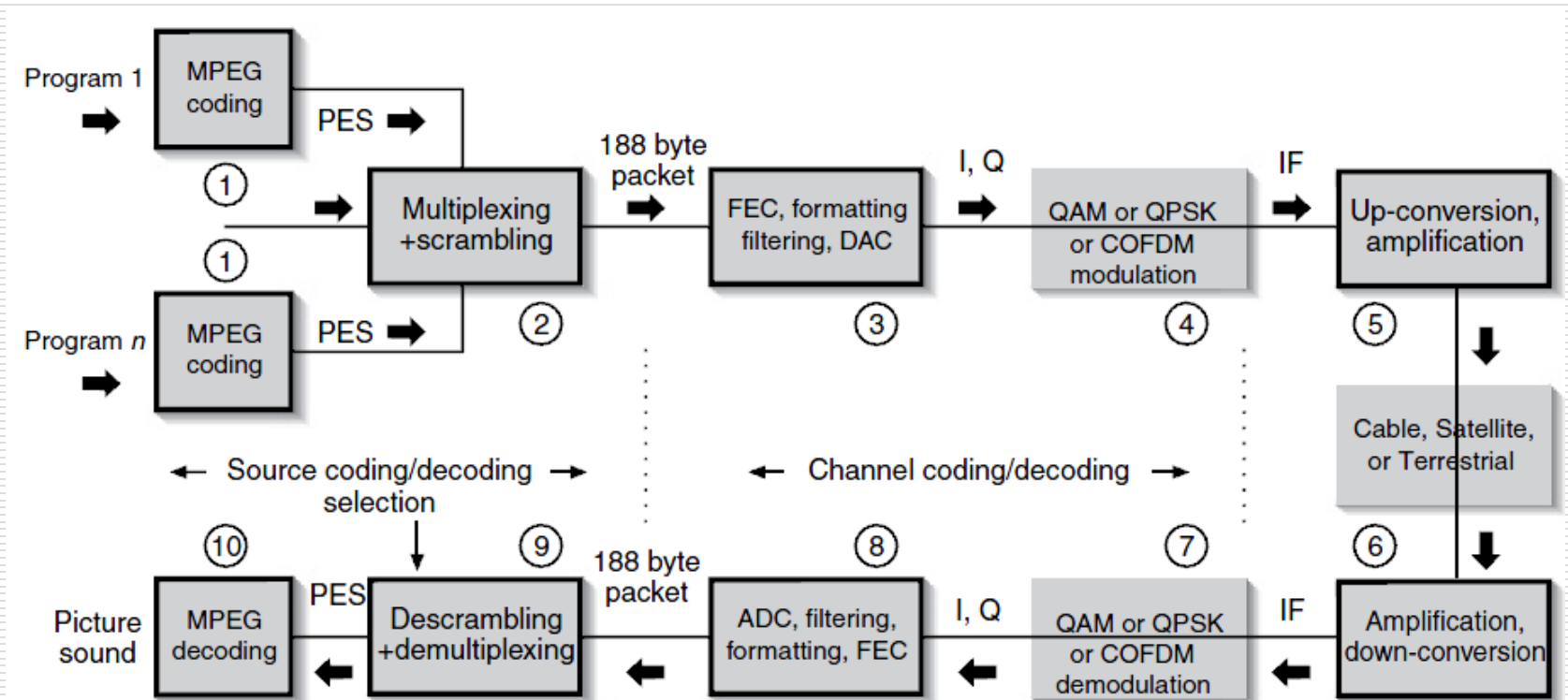
DIGITAL TELEVISION BROADCASTING SYSTEM



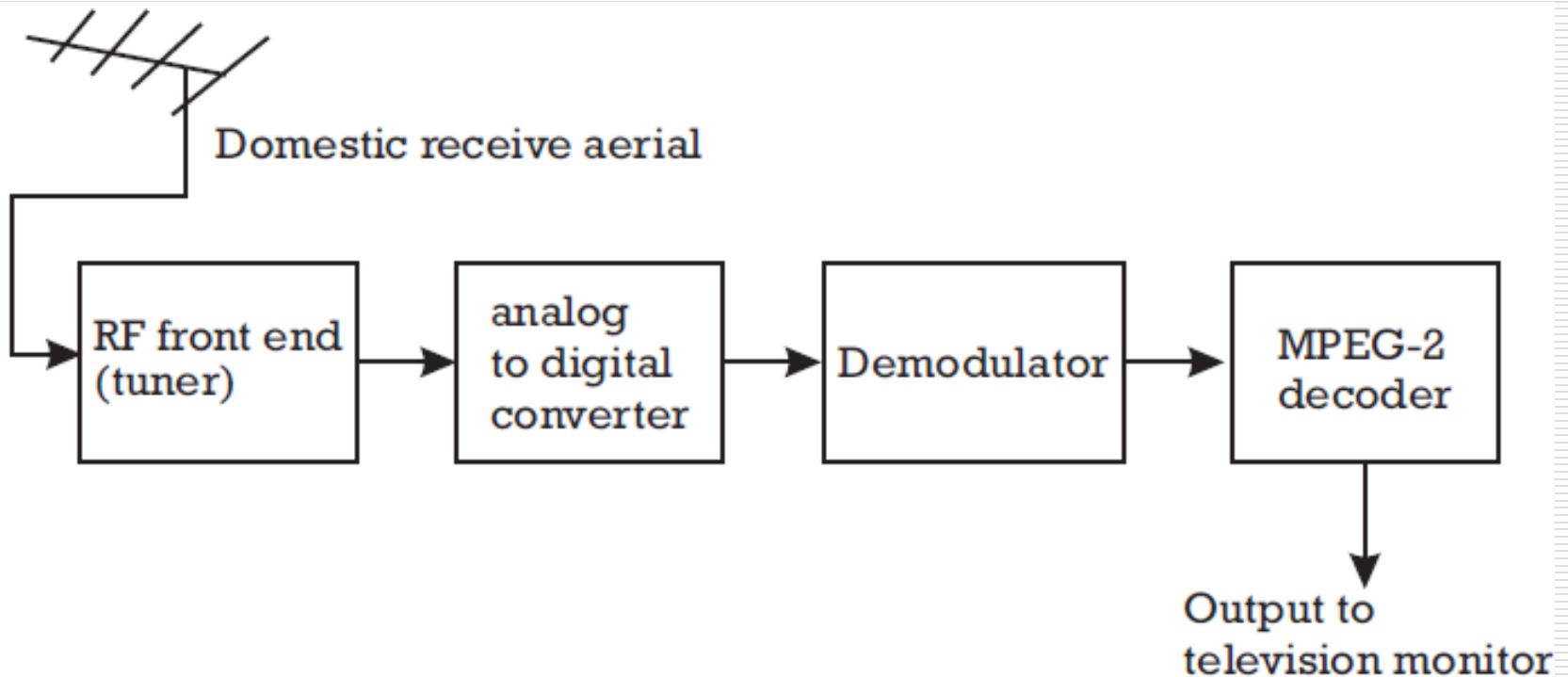
Digitalni TV sistem – elementi

- **Izorno kodovanje**
 - MPEG 2 / H.264
 - **Dodatni servisi**
 - SI, TXT, Subtitle
 - **Multipleksiranje**
 - **Digitalni prenos (DVB-T, S, C)**
 - Kanalno kodovanje
 - Modulacija
 - **Digitalni TV predajnik**
 - **Digitalni TV prijemnik**
 - **Middleware**
-

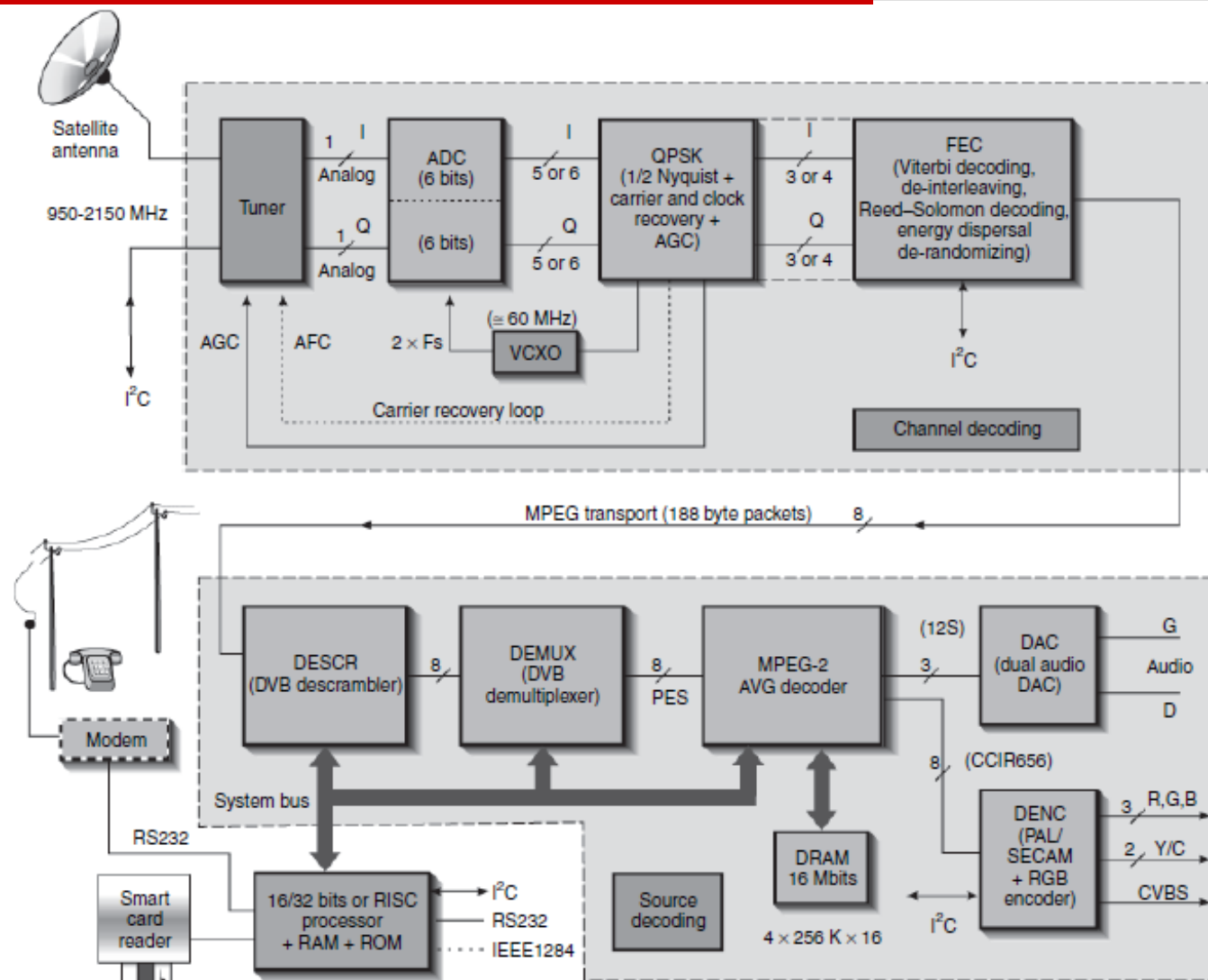
Digital TV system – elementi



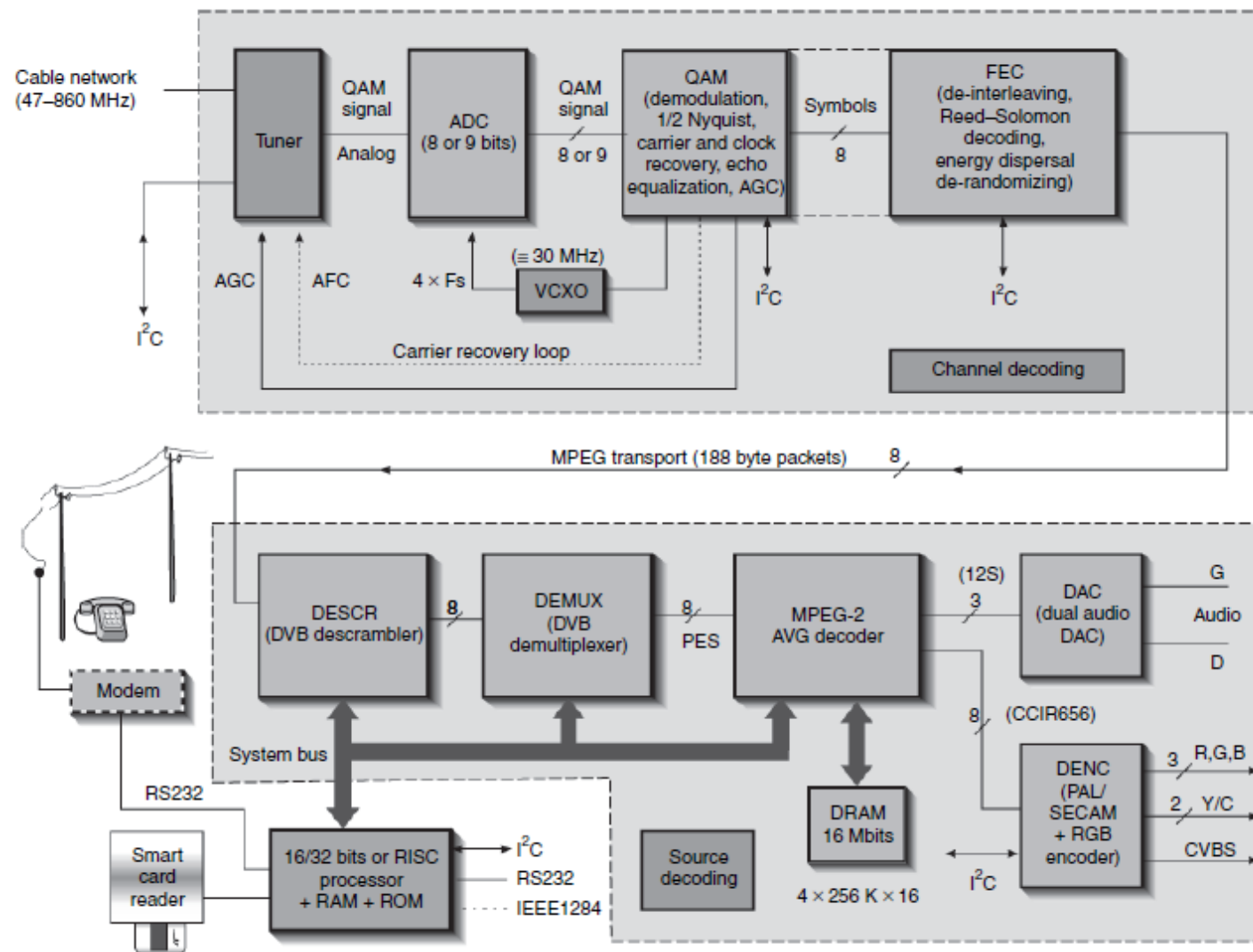
Digitalni TV prijemnik



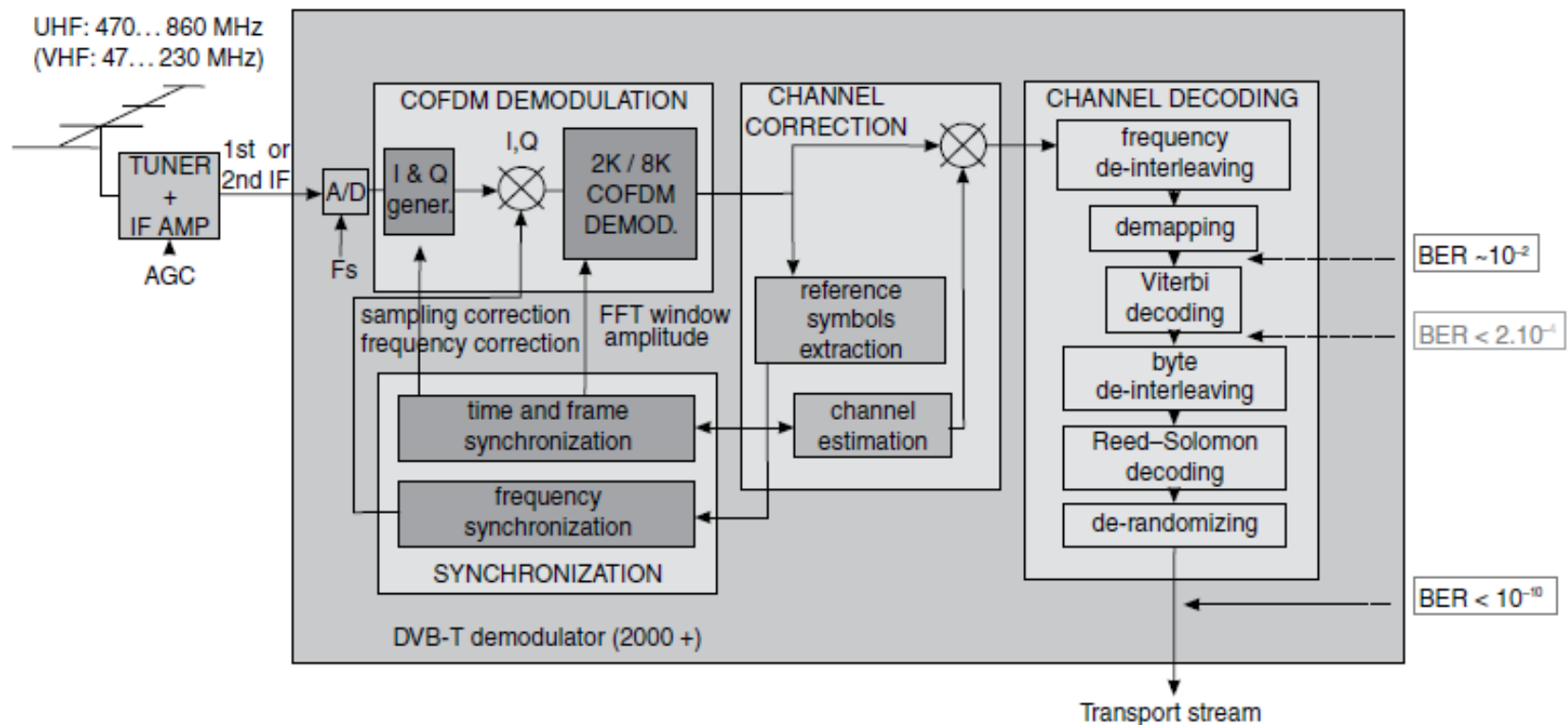
Satelitski DTV prijemnik



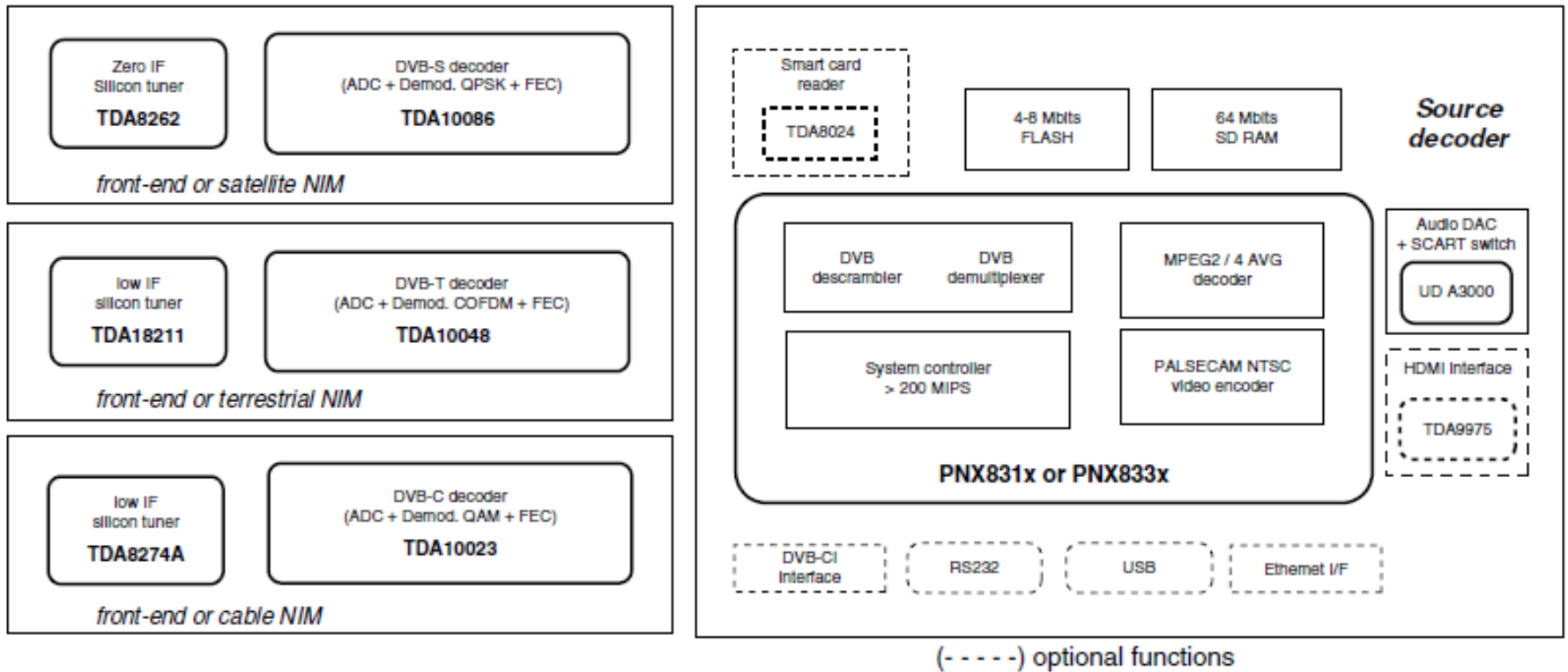
Kablovski DTV prijemnik



Zemaljski DTV prijemnik



Chip set DTV prijemnika – pr.

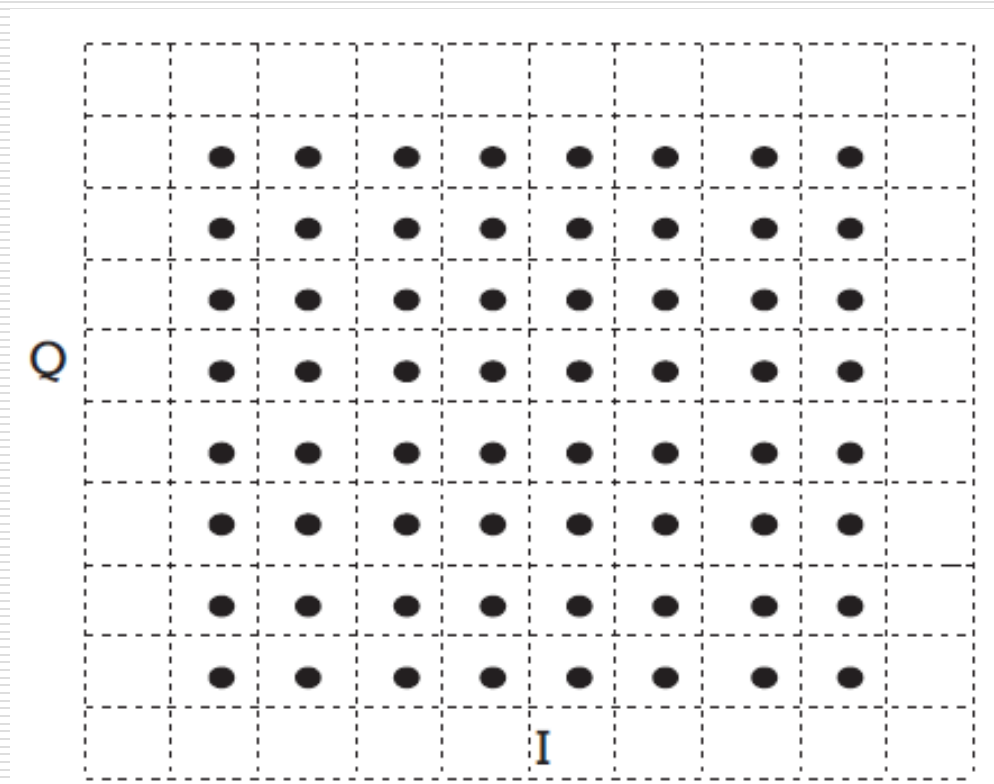


Merenja na prijemu

- **RF i IF snaga signala** - termalni senzor za merenje snage
- **Snaga šuma** - integrisana preko kompletnog propusnog opsega
- **Odnos signal nosioca-šum (C/N)**
- **BER u zavisnosti od C/N** –PRBS je input modulatora, up-konvertovana na frekvenciju kanala i pojačana za emitovanje
- **Back-off izlaz predajnika**
- **Fazni šum** - nestabilnost lokalnog oscilatora
- **Linearnost predajnika** - merenje ivičnih delova spektra RF signala
- **Ekvivalentna degradacija šuma (END)** – mera dodatih gubitaka (smanjenje u C/N) koji su izazvani u uslovima idealnog prenosnog sistema dodavanjem bilo koje stavke realne opreme.
- **Odnos modulacione greške (MER)** – vektorski signali
- **Kvalitet usluga (QoS)** - dužina i kvalitet prenosnog puta, proces dekodiranja - digitalni prenos

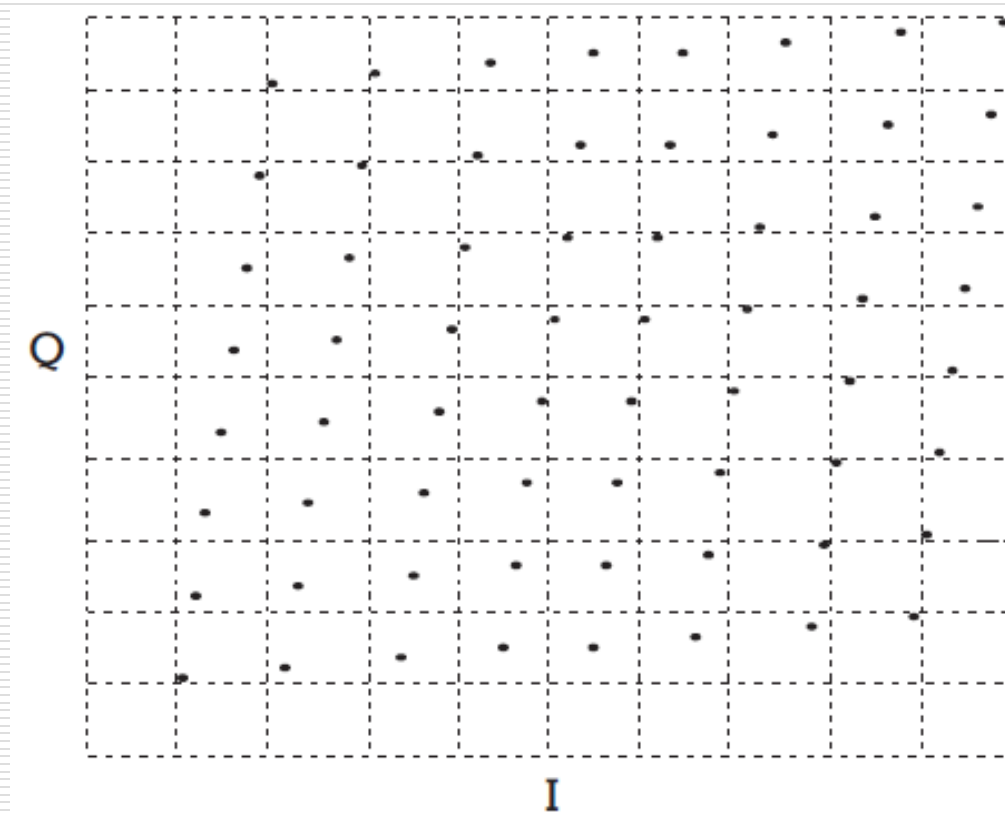
ANALIZA SIGNALA U VREMENSKOM DOMENU (IQ)

- *Tipičan 64-QAM konstelacioni dijagram (bez greške)*



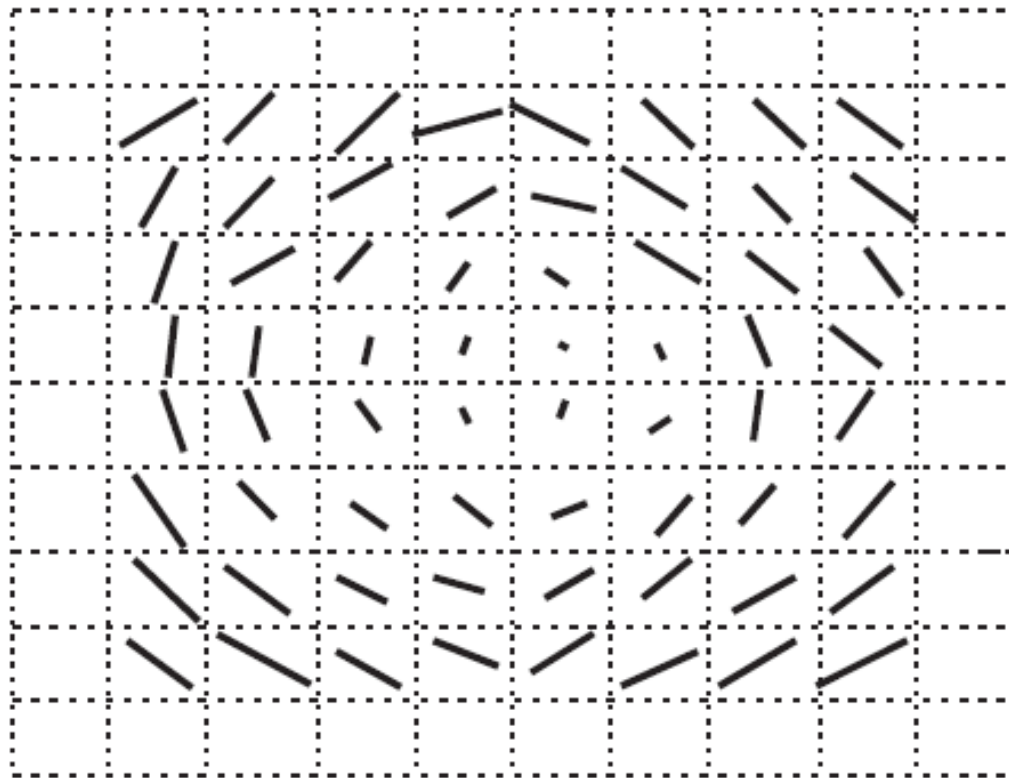
ANALIZA SIGNALA U VREMENSKOM DOMENU (IQ)

- *64-QAM sa konstantnom faznom greškom*



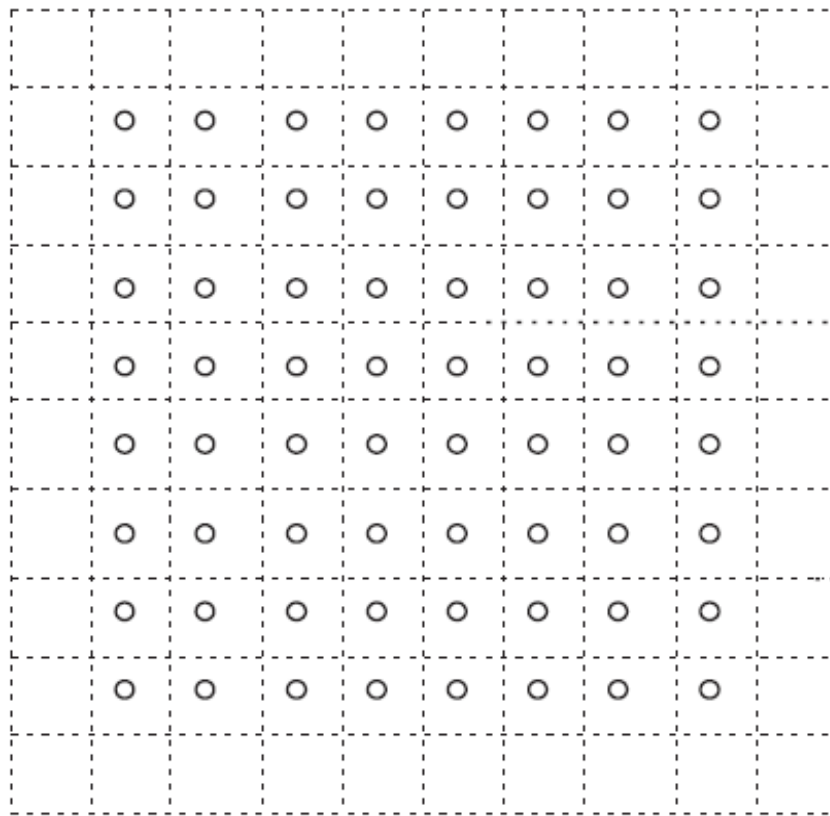
ANALIZA SIGNALA U VREMENSKOM DOMENU (IQ)

- *64-QAM sa faznim jitter-om*



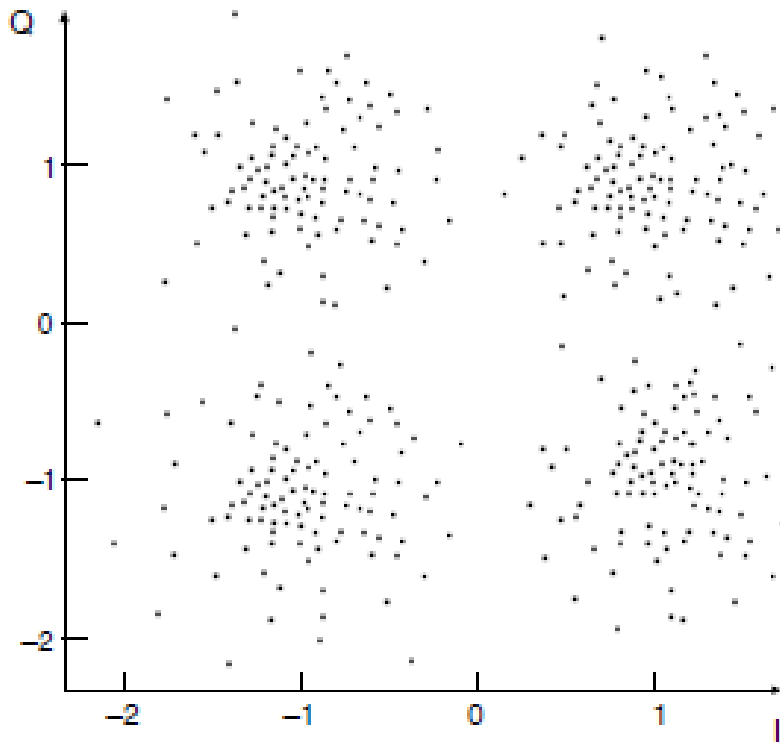
ANALIZA SIGNALA U VREMENSKOM DOMENU (IQ)

- *64-QAM konstelacioni dijagram sa signalom interferencije*



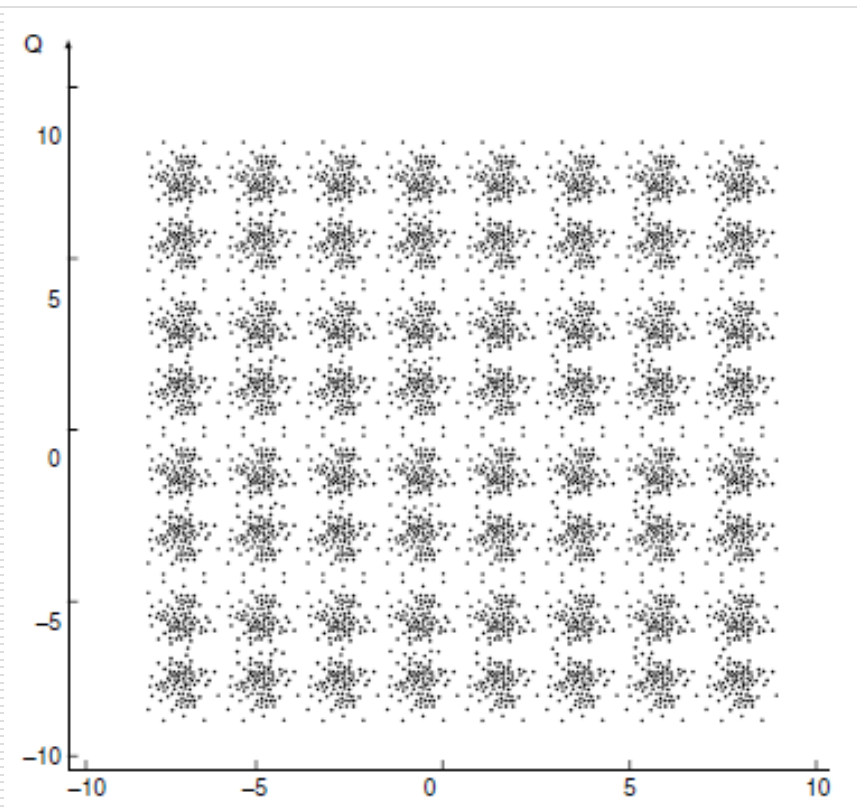
ANALIZA SIGNALA U VREMENSKOM DOMENU (IQ)

- *QPSK konstelacioni dijagram – slab satelitski prijem*



ANALIZA SIGNALA U VREMENSKOM DOMENU (IQ)

- *64-QAM konstelacioni dijagram – SNR=23dB*

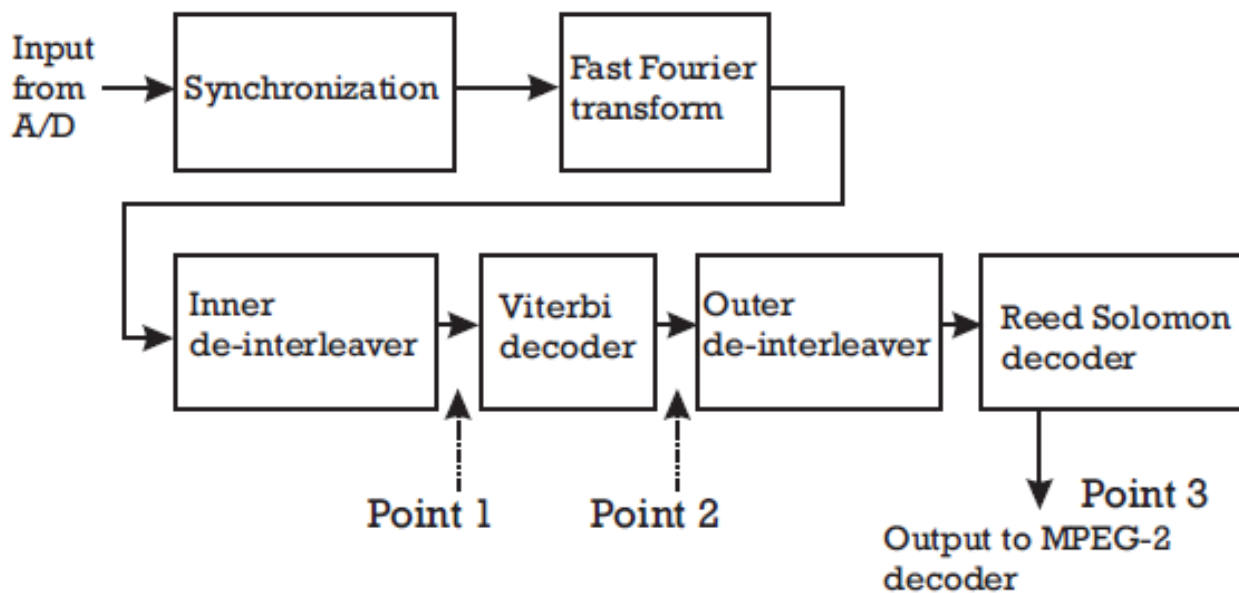


MERENJE *BER*

- **Bit Error Ratio**

- porediti predajnu i primljenu sekvencu bita
- odnos broja pogrešnih bita i totalnog broja bitova
- test sekvenca bita - PRBS signal

- **BER merne tačke za DVB-T prijemnike**



BER merne tačke za DVB-T prijemnike

- BER u zavisnosti od odnosa C/N,
64-QAM, kodni količnik 2/3 – COFDM signal

