

Headend of the Future...

FTTH Ready Video



VantagePoint

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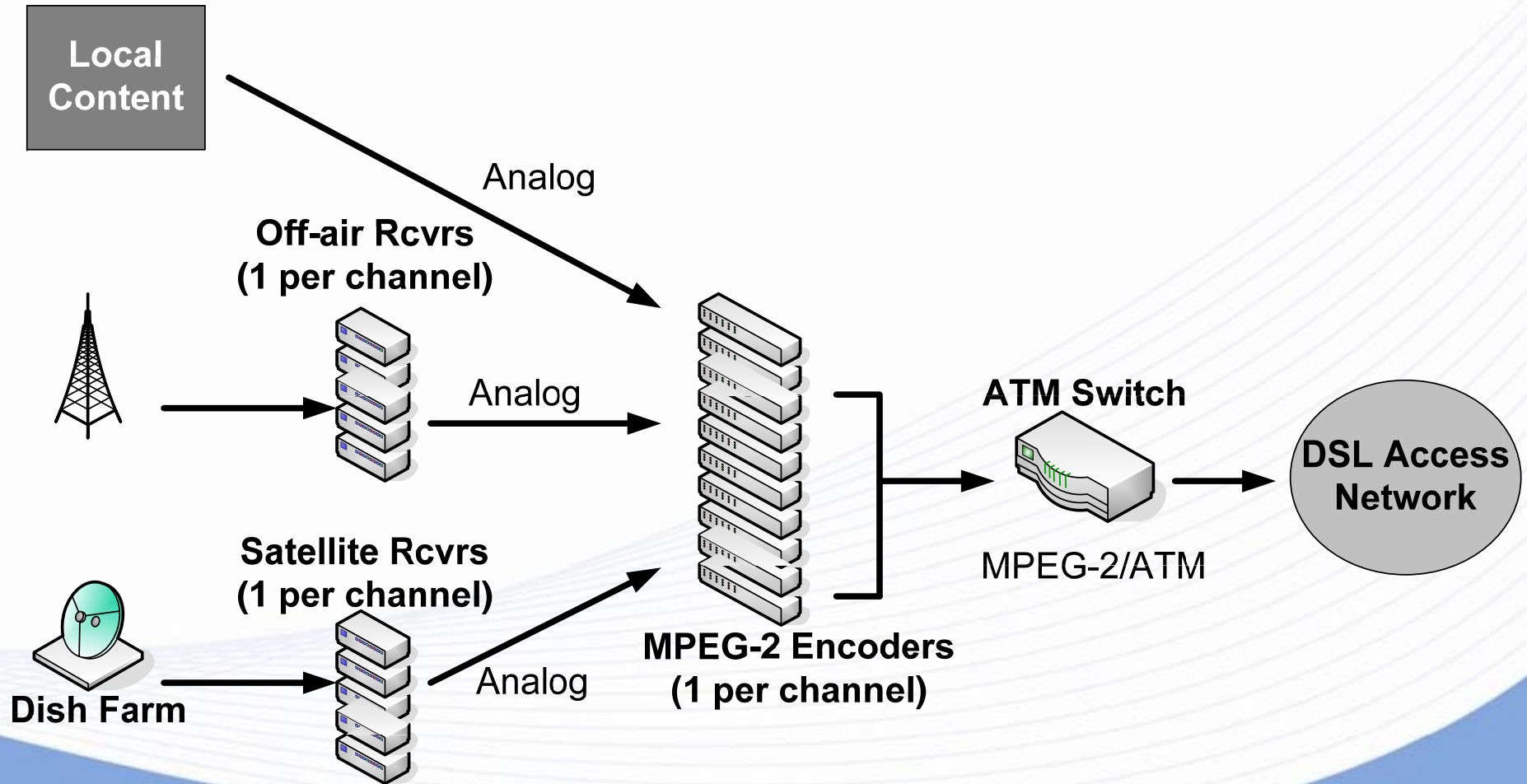
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100% Encoding Model (Late 1990s)



- **Incoming Signals to Headend:** Primarily Analog
 - Requires 1 Receiver And 1 Encoder For Each Channel
- **Headend Output**
 - Primary Video Access Network: VDSL
 - Requires MPEG-2 over ATM
 - SD Only
 - 5-6 Mbps Per Channel – Constant Bit Rate (CBR)

100% Encoding Model (Late 1990s)

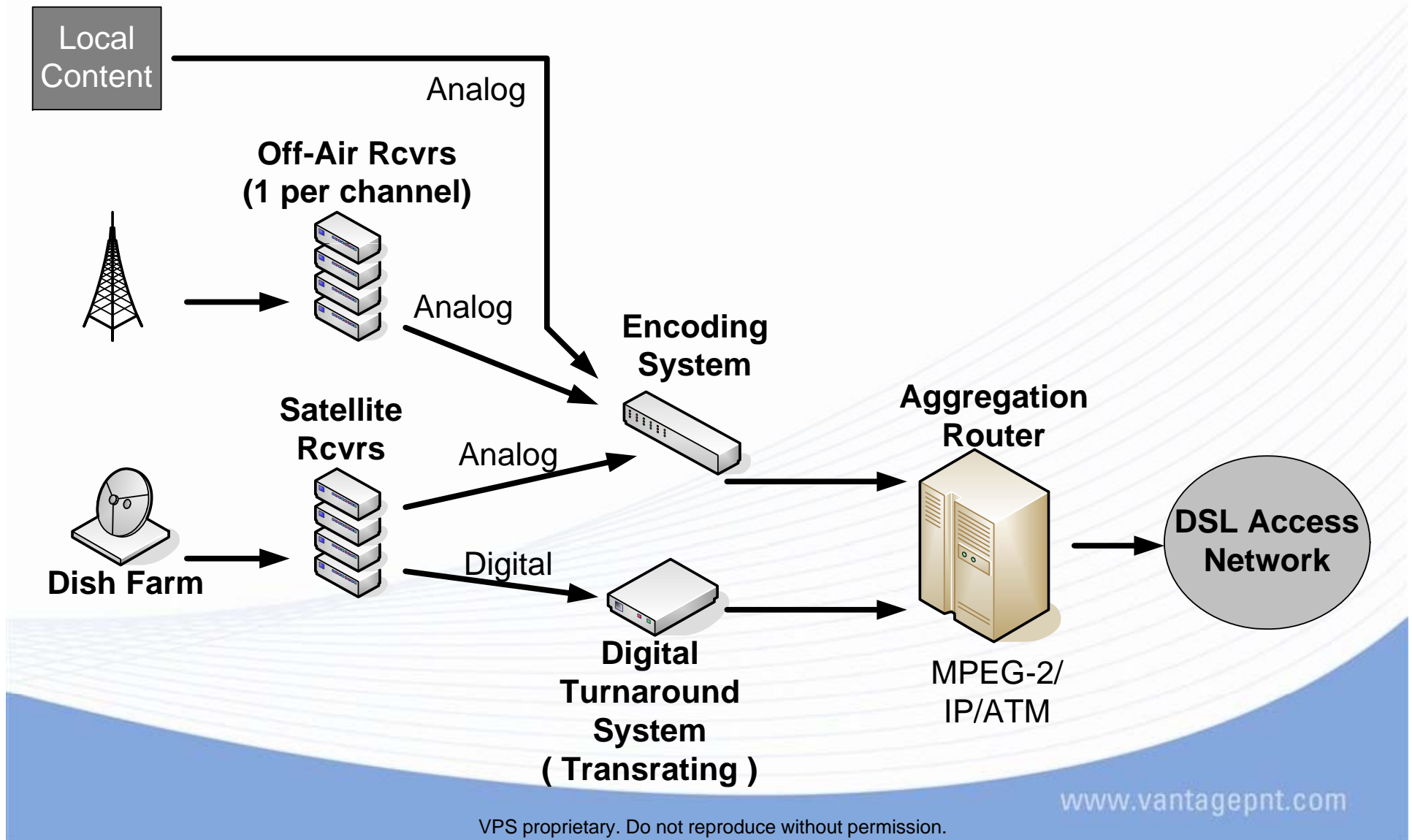




Transrating Model (Early 2000s)

- Incoming Signals to Headend: Mix of Analog and Digital
 - Content providers transition an increasing number of channels to digital
 - Encoder manufacturers release products that can transrate digital satellite signals without need to re-encode
 - Reduces number of encoders and receivers needed
- **Headend Output**
 - Primary video access network: ADSL
 - Requires MPEG-2 over IP over ATM
 - SD Only
 - 3-4 Mbps per channel – CBR
 - Lower per channel cost

Transrating Model (Early 2000s)

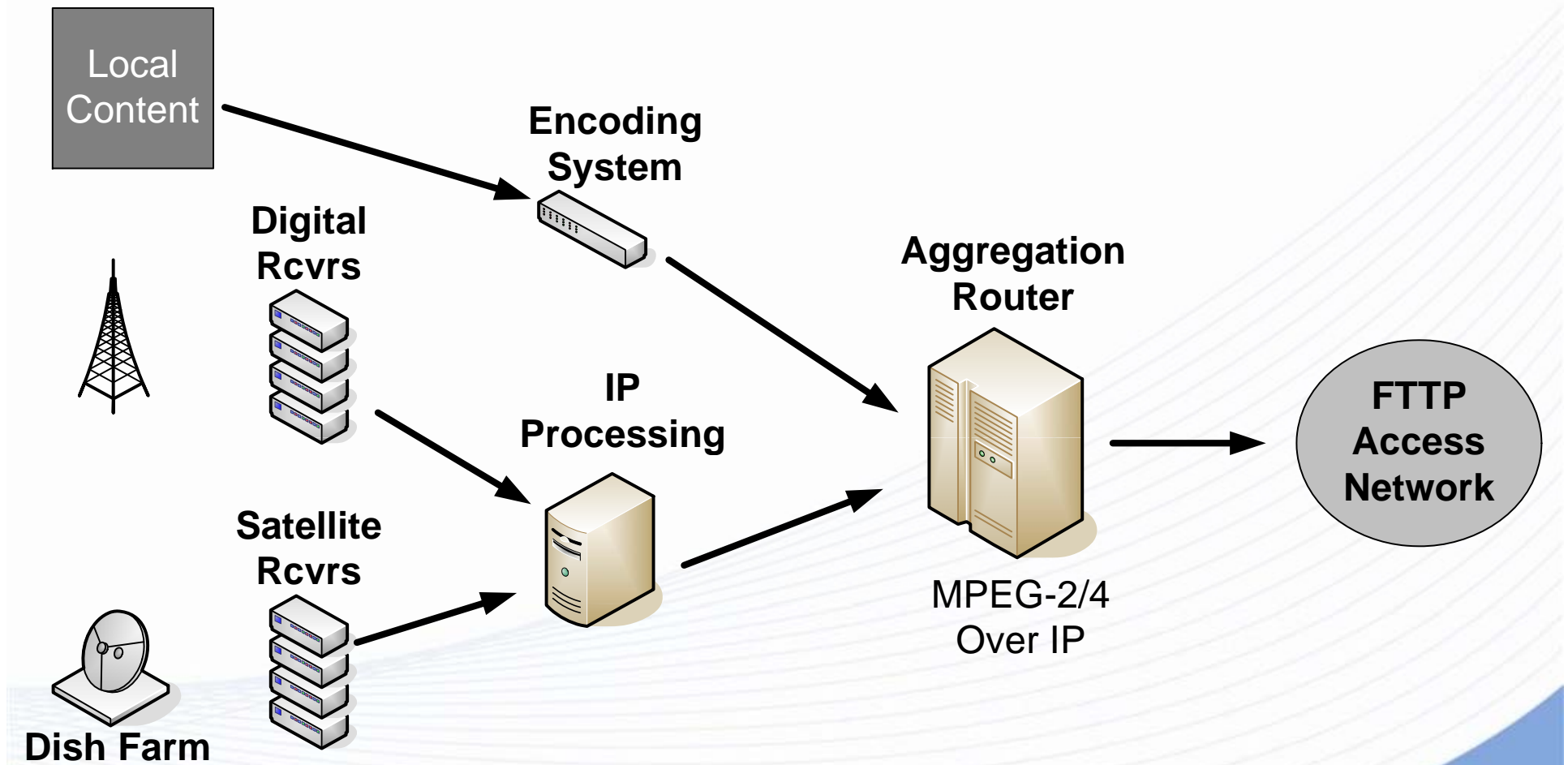


Pass Through Model (Today)



- **Incoming Signal to Headend: Primarily Digital**
 - Content providers transitioning to deliver MPEG-4 content directly
 - Allows for passing content through HE without much processing
- **Headend Output**
 - Primary video access network: FTTP
 - Reduced concern for channel bandwidth
 - MPEG-2 And MPEG-4 over IP
 - SD & HD
 - VBR & CBR
 - Lower per channel cost

Pass Through Model (Today)

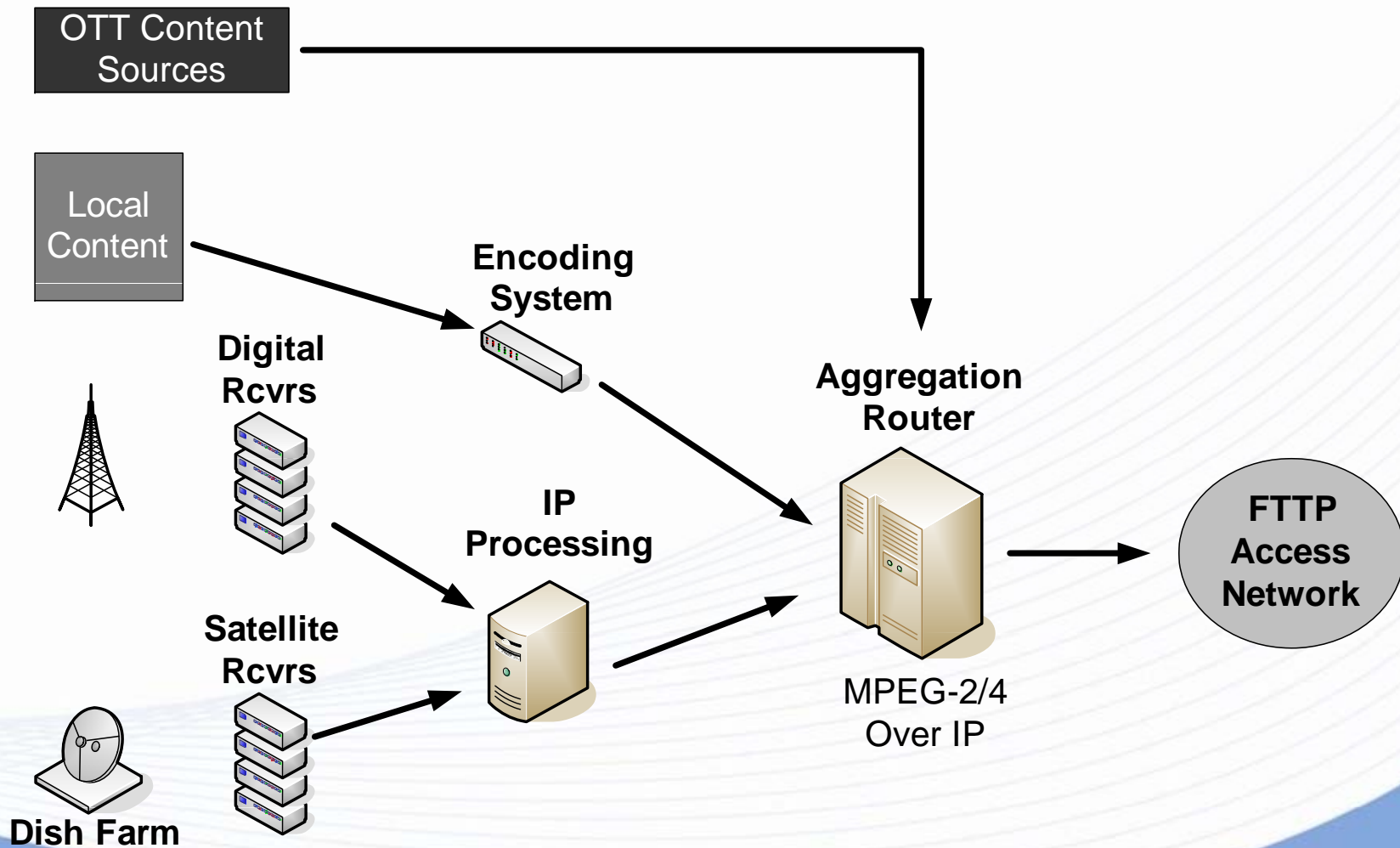


Addition of OTT Video (Future)



- Challenges for incorporating OTT video
 - Uplink/Downlink requirements for communication with OTT providers
 - Middleware upgrades required to allow subs to easily access OTT content
 - Set-top network changes required
 - Historically been on private network
 - How to allow access to public network while maintaining security
 - Bandwidth requirements to Internet for OTT services raises operations expenses
 - Video quality may vary greatly between “broadcast” channels and OTT content

Addition of OTT Video (Future)





Summary

- FTTP technology allows for more flexibility
 - Less headend equipment required
 - Lower headend capital investment costs
- Future OTT video challenges need to be addressed
 - Video quality control
 - Operational issues (including Internet bandwidth costs)
 - Caching opportunities