International Telecommunication Union

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Quality Assurance for IPTV

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BT

Research and Venturing

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Overview

- Introduction
- Perceptual Quality Measurement
- NR perceptual quality method
- Quality Assurance for IPTV
- BT QA Tool
- Demonstration

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Quality Assurance and Perceptual Quality

- Standard QA tools exist for TV services
  - Perform syntax checking + Post-decode analysis (e.g. bit-rate, frame rate)
  - Can include basic quality index
- Such tools do not include perceptual quality measurements
- BT has developed a QA tool for IPTV
- Tool is based on accurate, real-time perceptual quality measurements

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Objective Quality Measurement

- Quality measurement:
  - Objective
    - Pure computational
    - Network performance
  - Objective perceptual
    - measurements representative of human perception

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Objective Perceptual Quality Measurement

- Full Reference
- Reduced Reference
- No Reference

- Traditionally methods operate at pixel level

- BT has developed a novel bit-stream based approach to objective perceptual quality measurement

Bit-stream Based PQM

- Why bit-stream?
  - Includes quality critical information
    - quantiser step-size, DC/AC co-efficients, MB skipping, motion vector values
  - This is lost during decoding
  - Computationally light … fast measurement possible
  - Specific to coding scheme – accuracy advantages

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BT NR Model

- Measurement tool embedded in a H.264 decoder
- Parser extracts parameter values from bit-stream prior to decoding
- Additional parameter set can be extracted from decoded picture
- This hybrid approach provides
  1. information about encoding applied to picture
  2. picture properties following decoding

Performance

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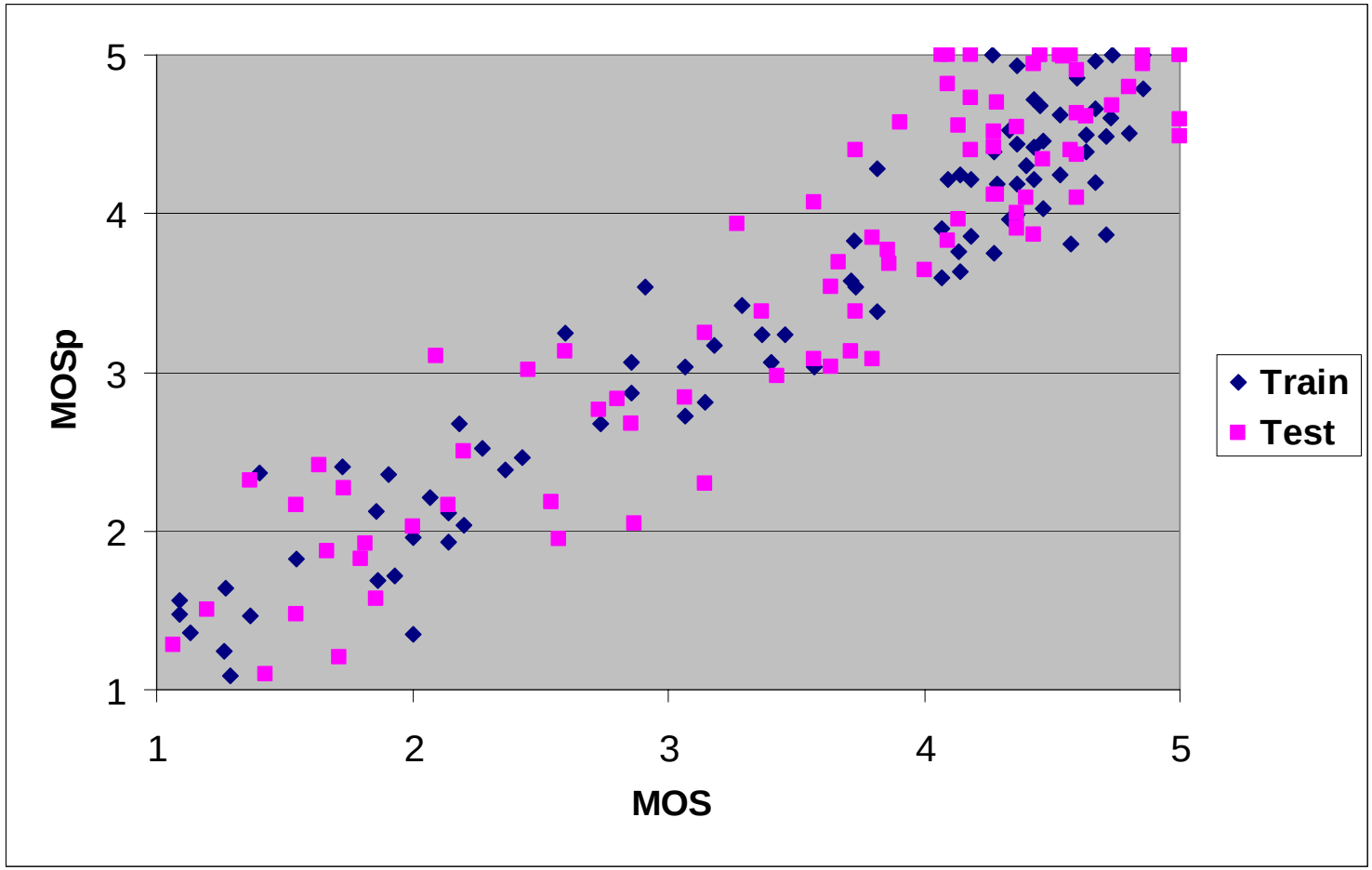

r = 0.94

MSE = 0.4

Quality Assurance for IPTV

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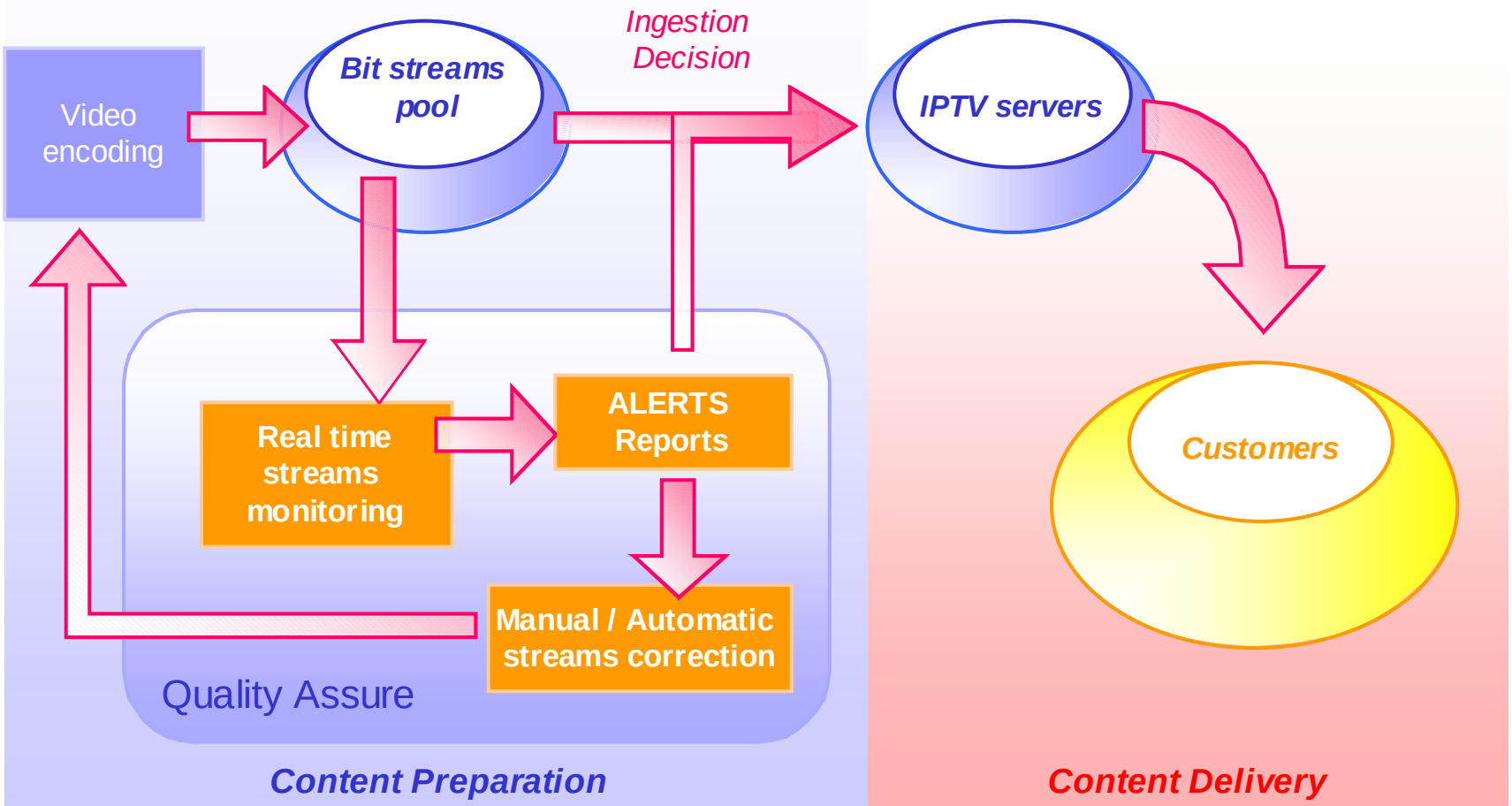

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BT Quality Assurance Tool

- Provides perceptual video quality measurement + audio analysis
- QA tool includes user interface
- Allows operator to select quality threshold (according to ITU quality scale)
- Additional thresholding can be invoked to determine pass / borderline / fail content
- Operator can examine quality of suspect quality content

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Demonstration