



Objective Evaluation of Video Quality over Satellite Networks

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Transportable Video Quality Measurement System (TVQMS)

T Designed and built by NTIA / ITS

T Assembled from off-the-shelf hardware components

T Utilizes ITS–developed (and patented) software



Objectives

T Describe the TVQMS

T Explain measurements that can be made

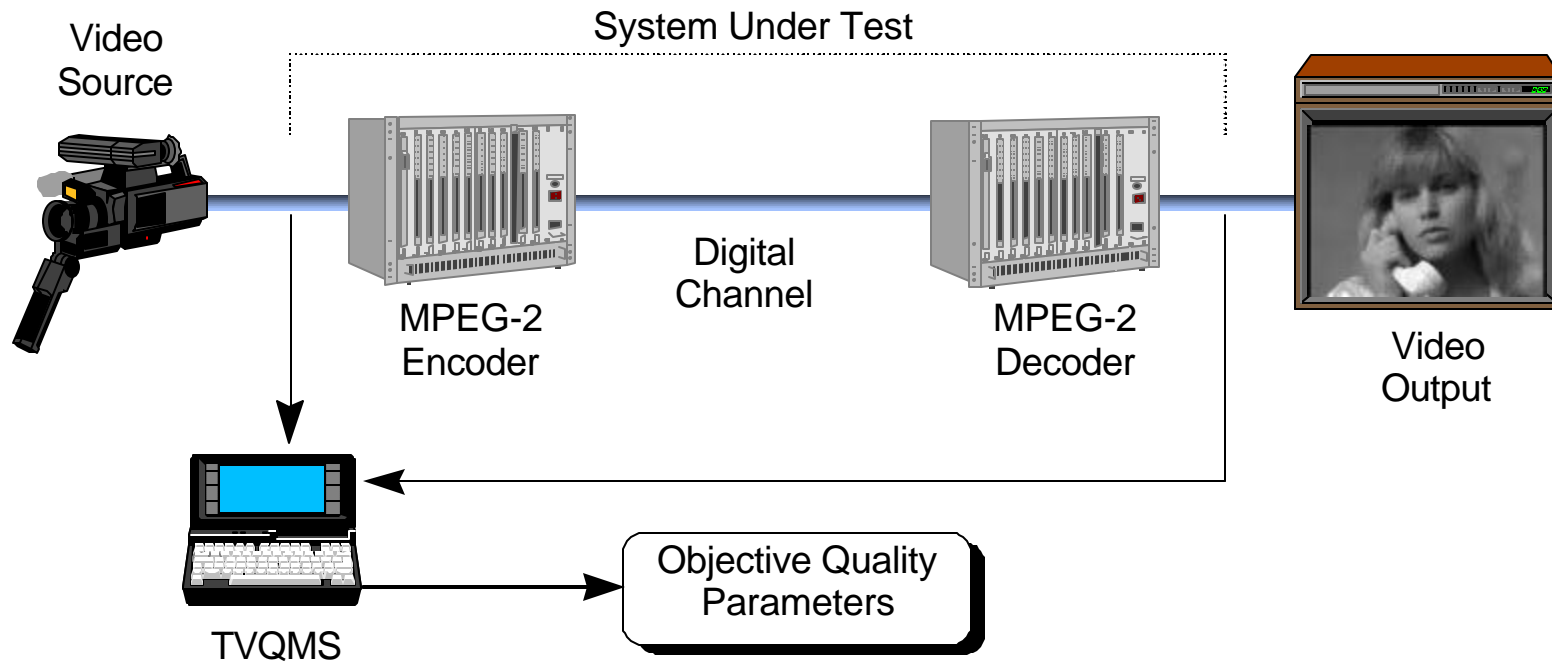
- Parameters → Objective Quality Rating
 - Objective and Repeatable
 - Correlate well with subjective measurements
- Differential Mean Opinion Score (DMOS)

T Illustrate one possible experiment scenario

T Identify possible measurement applications

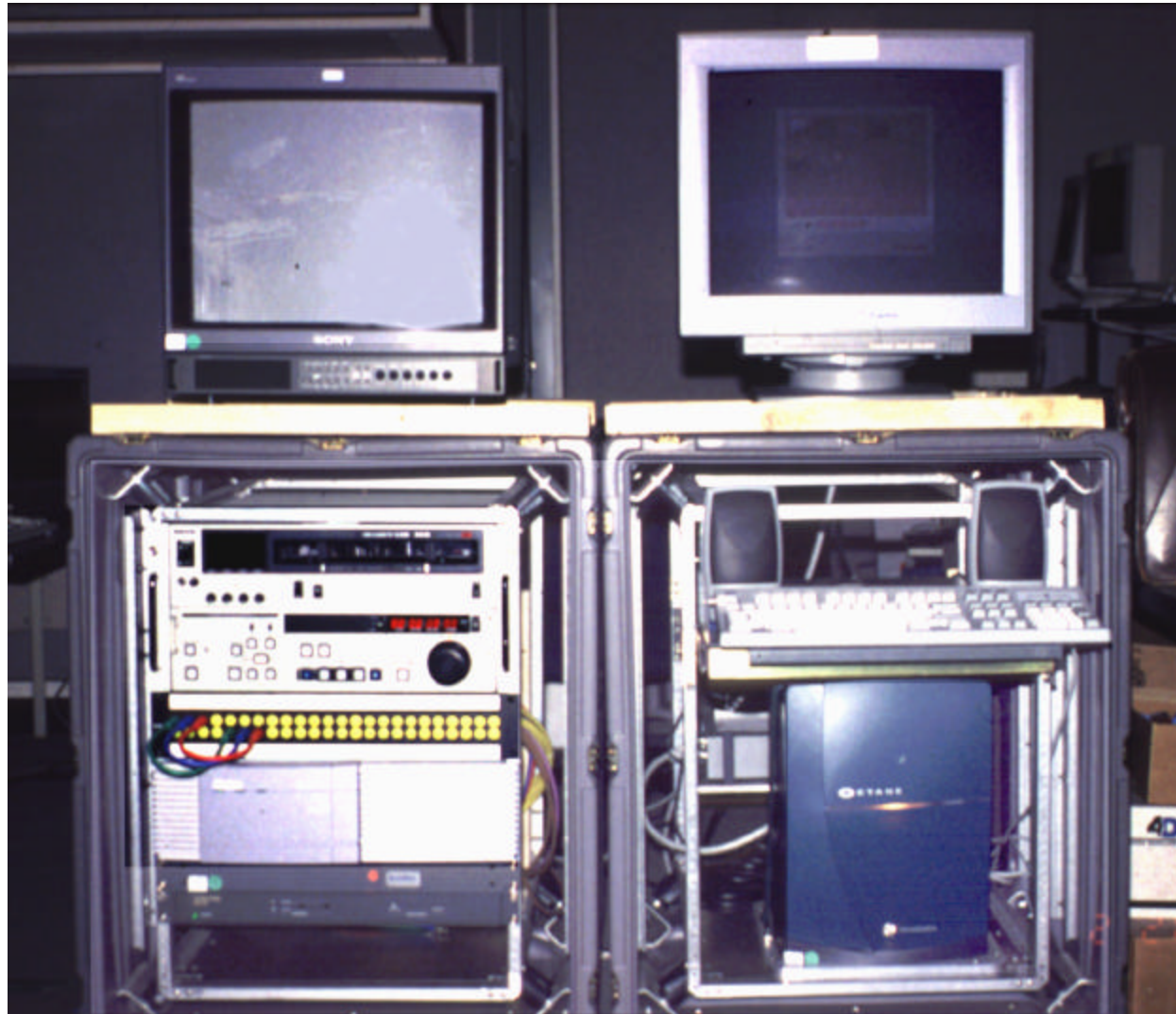
Measurement Approach

(Non Real-Time)

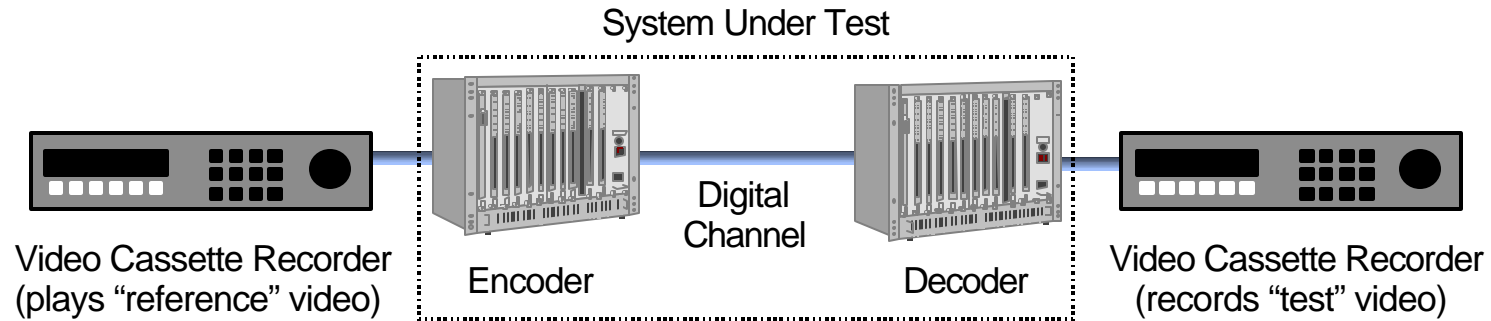




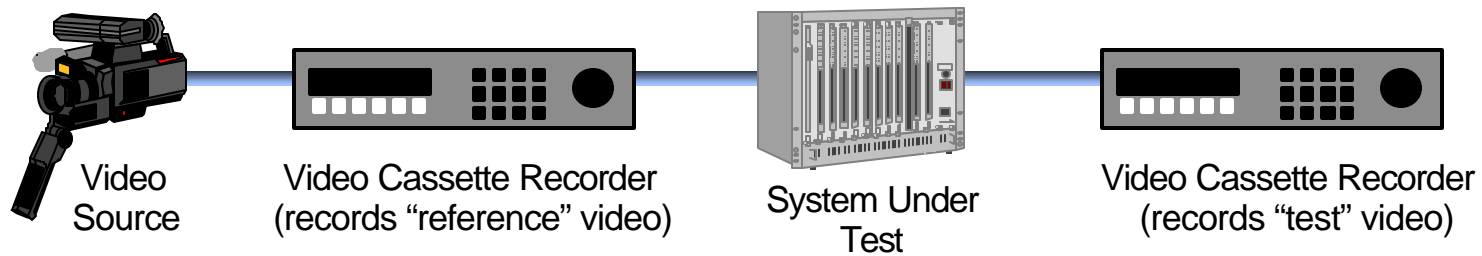
TVQMS Front-View



TVQMS Applications

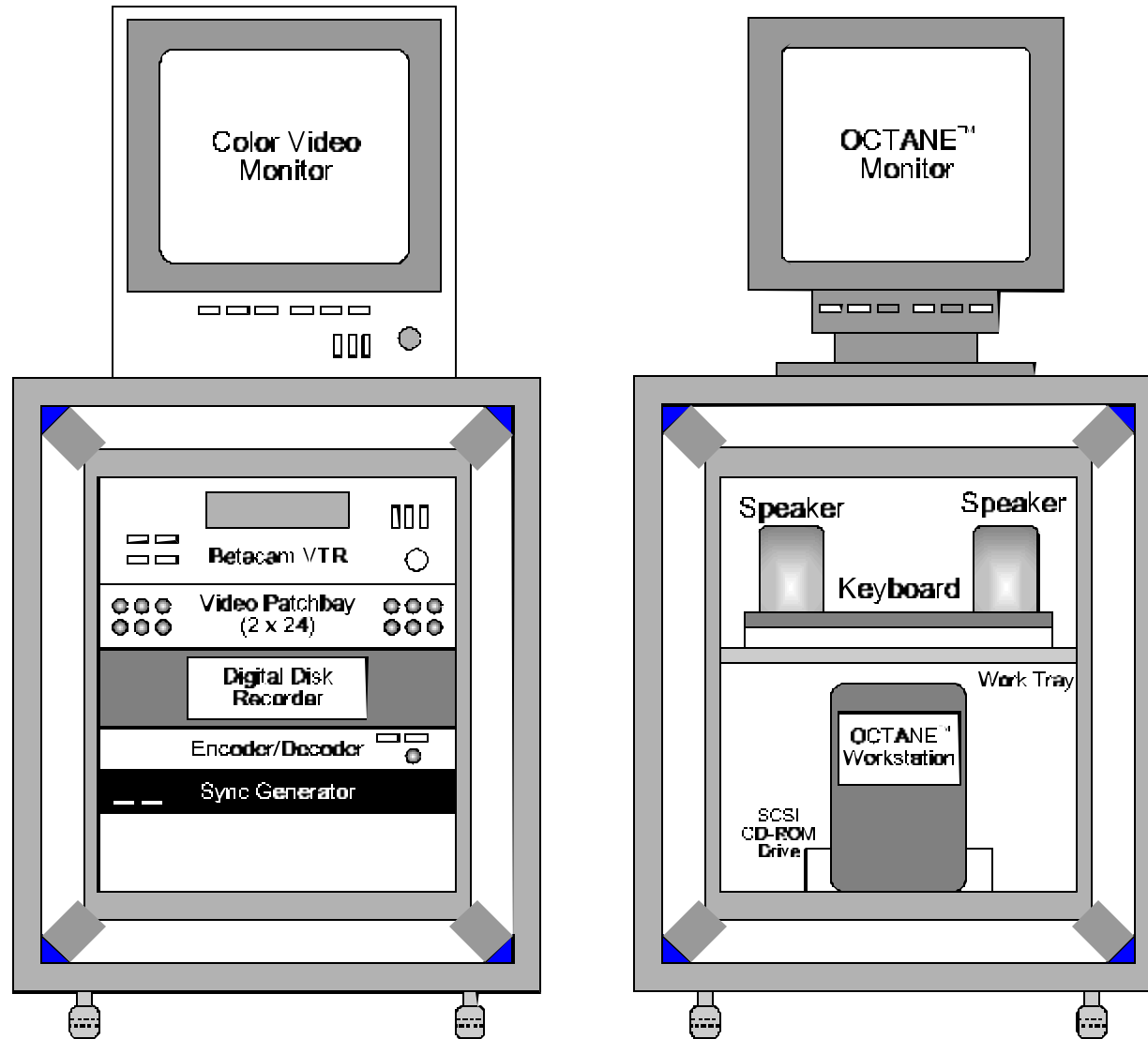


Out-of-Service Measurements



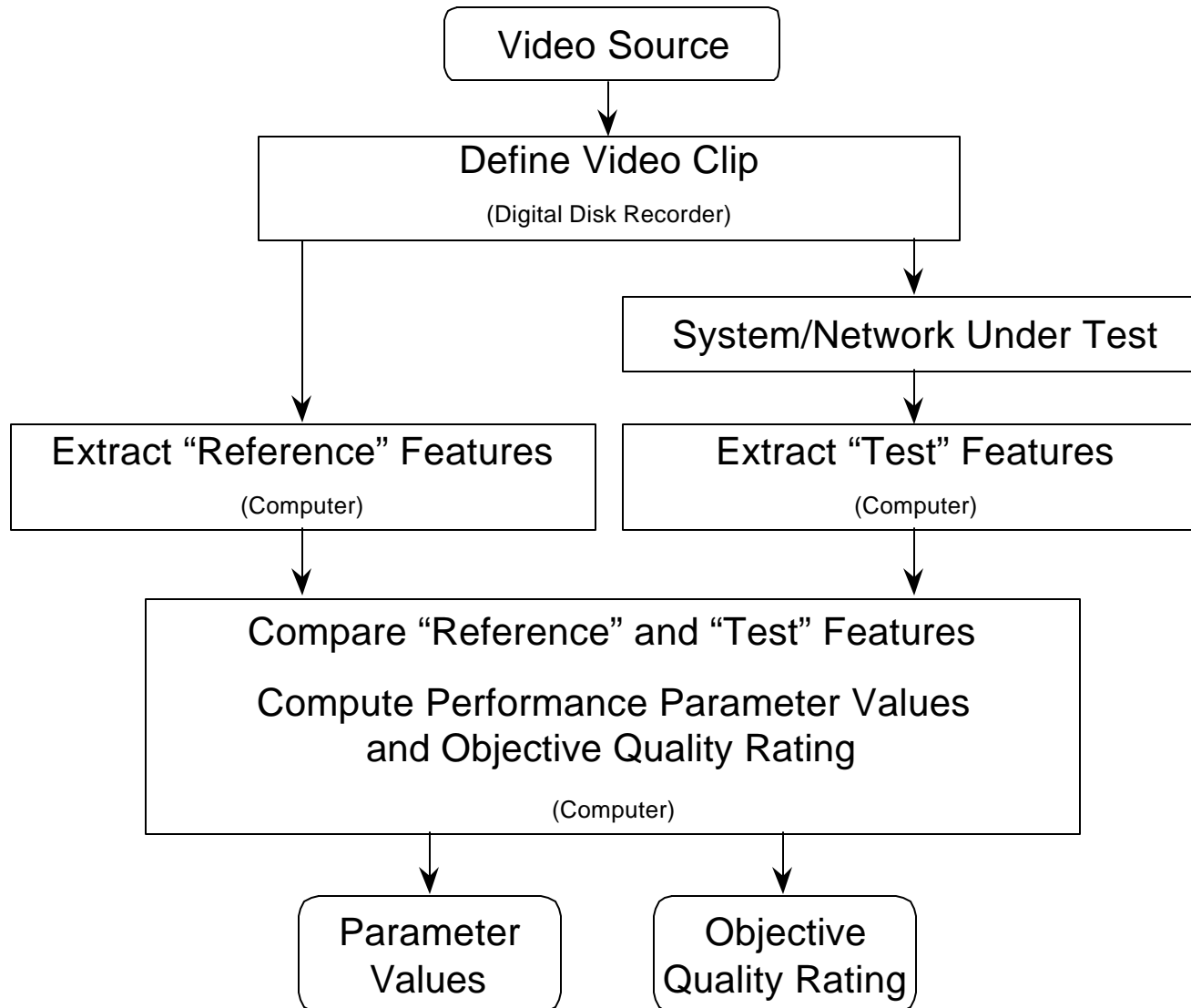
In-Service Measurements

TVQMS Front-View





TVQMS Functional Diagram





“FEATURE”

A quantity of information (summary statistics) associated with a specific Spatial–Temporal region of a video scene

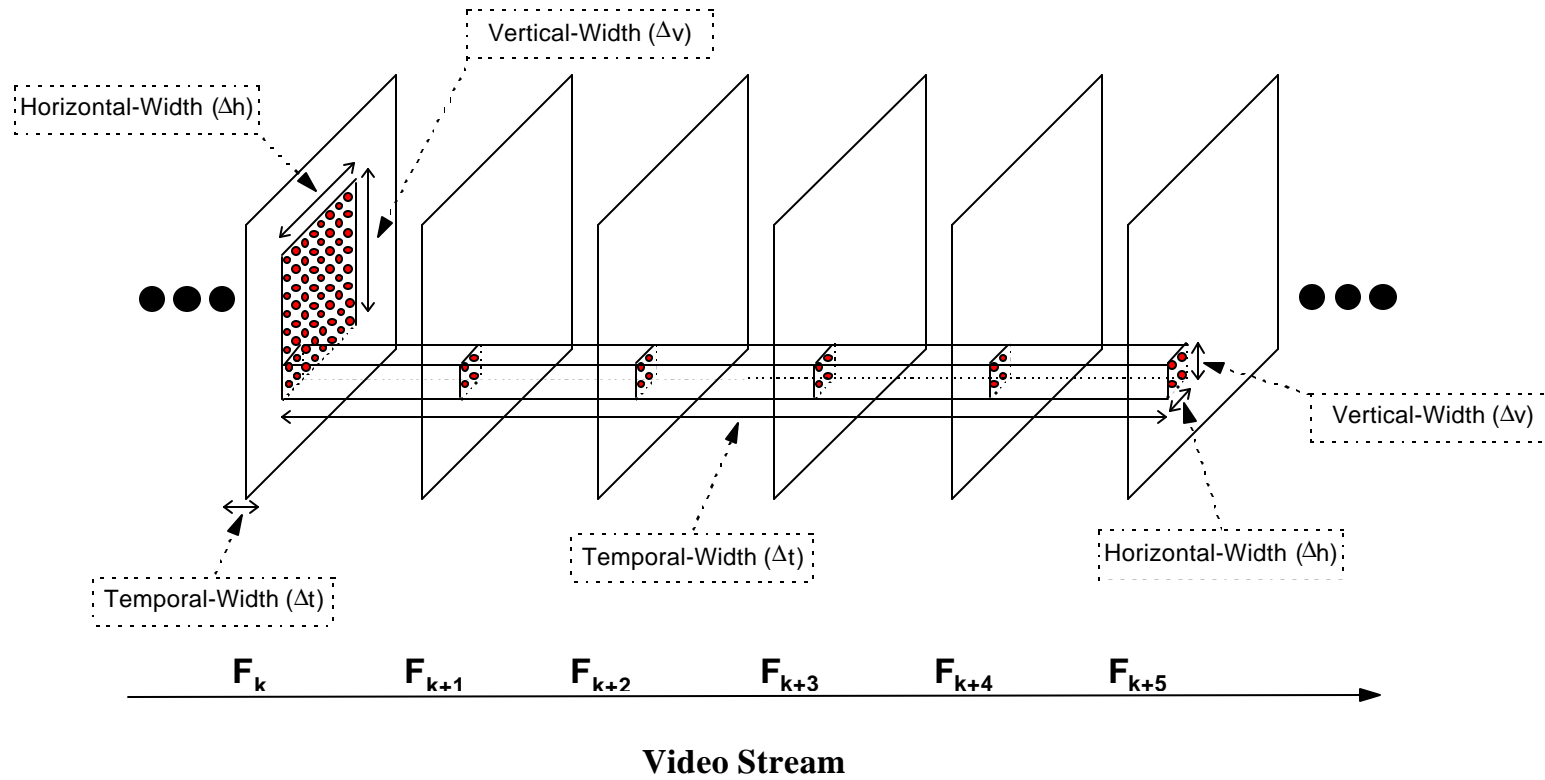
Three types—

T Spatial Feature: The activity of image *edges* or spatial gradients

T Temporal Feature: The activity of absolute *motion* differences or temporal gradients between frames

T Chrominance Feature: The activity of *color saturation*

Spatial-Temporal (S-T) Regions





Parameters

T Recommended to VQEG (by NTIA / ITS)

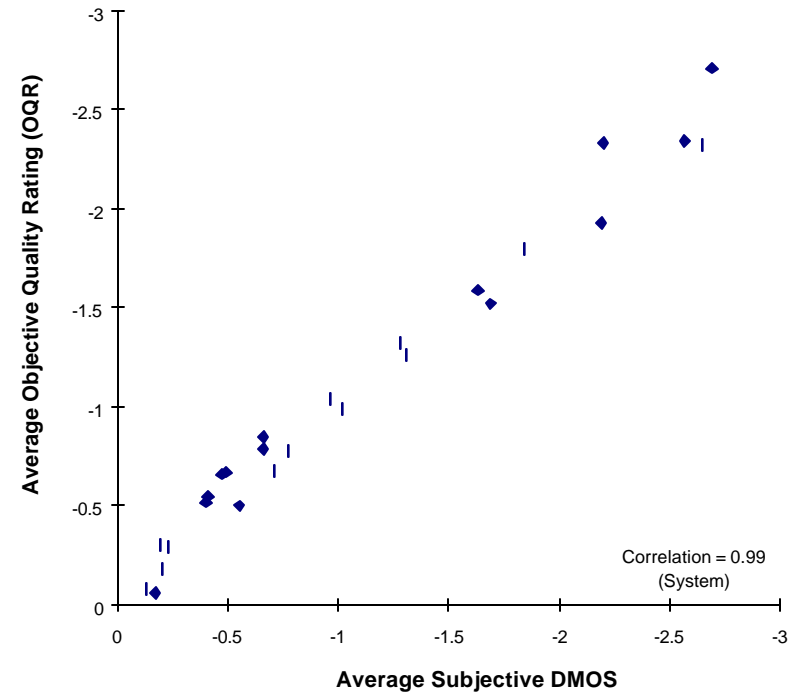
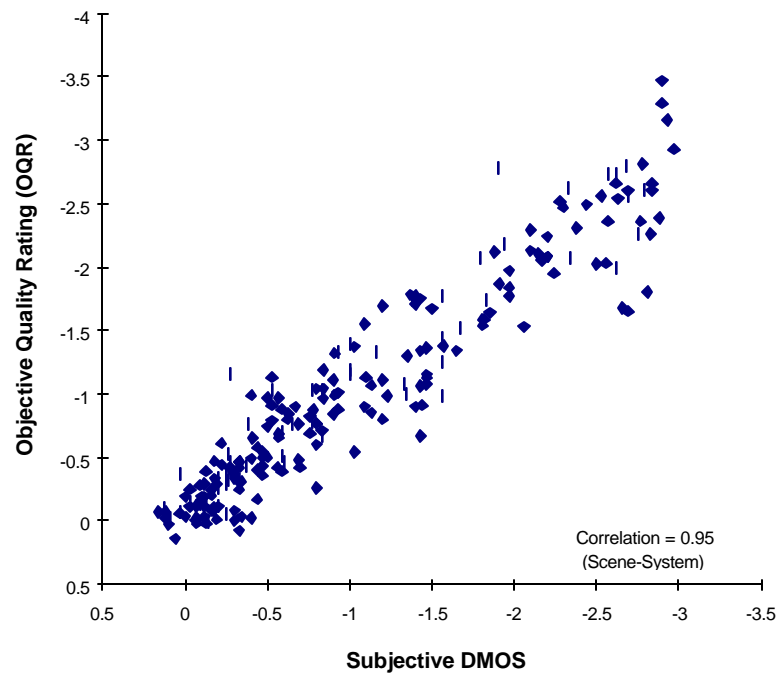
- Loss in spatial activity
- Gain in temporal activity
- Loss in chroma activity
- Gain in chroma activity
- Gain in spatial-temporal activity

T ITU Video Quality Experts' Group (VQEG)



Interpretation of Parameter Values

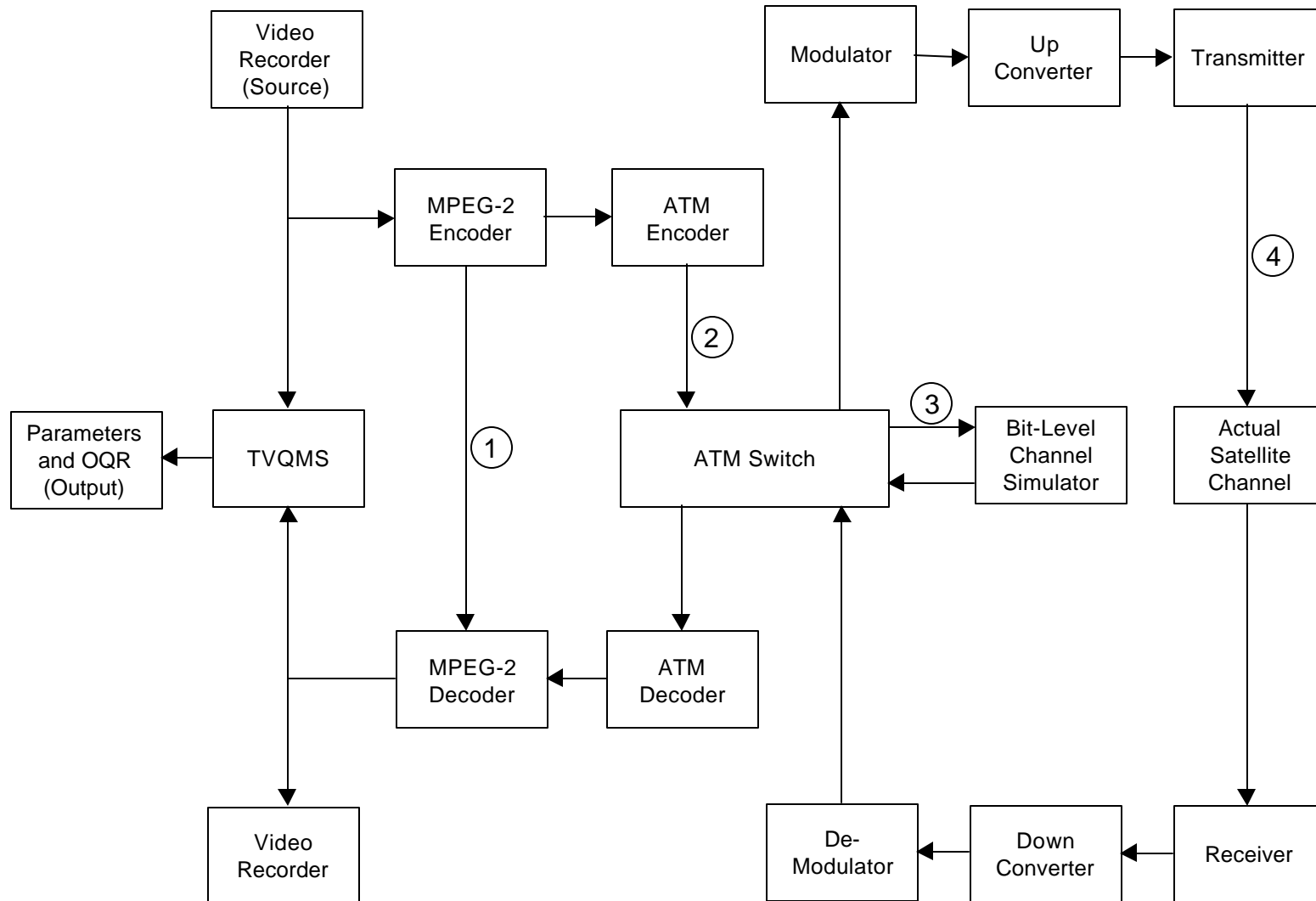
3 experiments: 26 video systems and 36 test scenes



$$E[DMOS] = OQR = w_1p_1 + w_2p_2 + w_3p_3 + w_4p_4 + w_5p_5$$



Possible Quality-Measurement Scenario





Summary

T TVQMS provides quantitative and repeatable quality (performance) results

T Measurements — in the lab or on-site

- Non real-time now
- Real-time capability under development
- Metrics — easy to update

T Utilization / Application

- Satisfy users' needs for video performance information
- Provide new information to ITU-R Recommendation on ATM Performance (e.g., Annex 2, Section 4)
- Provide information to new ITU-R Recommendation on IP Performance