

IP video and file transmission technique for contribution purpose

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Background

- ❖ Popularization of file based workflow
 - ◆ Video materials and Master files (Tape → Files)
- ❖ Wide availability of IP network
 - ◆ FTTH, Cable Internet; LTE, WiMAX; BGAN
 - ◆ IP-VPN, Ether-VPN
- ❖ Penetration of Cloud computing
 - ◆ Virtualization of data storage, computation for image processing, editing, and coding



NABSHOW
Where Content Comes to Life

- ⇒ Standardization
- Data format
 - Protocol
 - System

❖ ITU: International Telecommunication Union

◆ ITU-T SG9: Broadband cable and TV

- telecommunication systems for contribution, primary distribution and secondary distribution of television, sound programmes ...

<http://www.itu.int/en/ITU-T/studygroups/2013-2016/09/Pages/default.aspx>

❖ Recommendation J.284

- ◆ Requirements and framework for gathering electronic content over IP-based network



❖ Recommendation J.285

- ◆ Architecture for synchronized programme transfer with pull operation over IP based networks

SG9 at a glance

WP1

- Video transport
 - Transmission
 - Security
- Quality
 - End-to-end
 - Subjective assessment

WP2

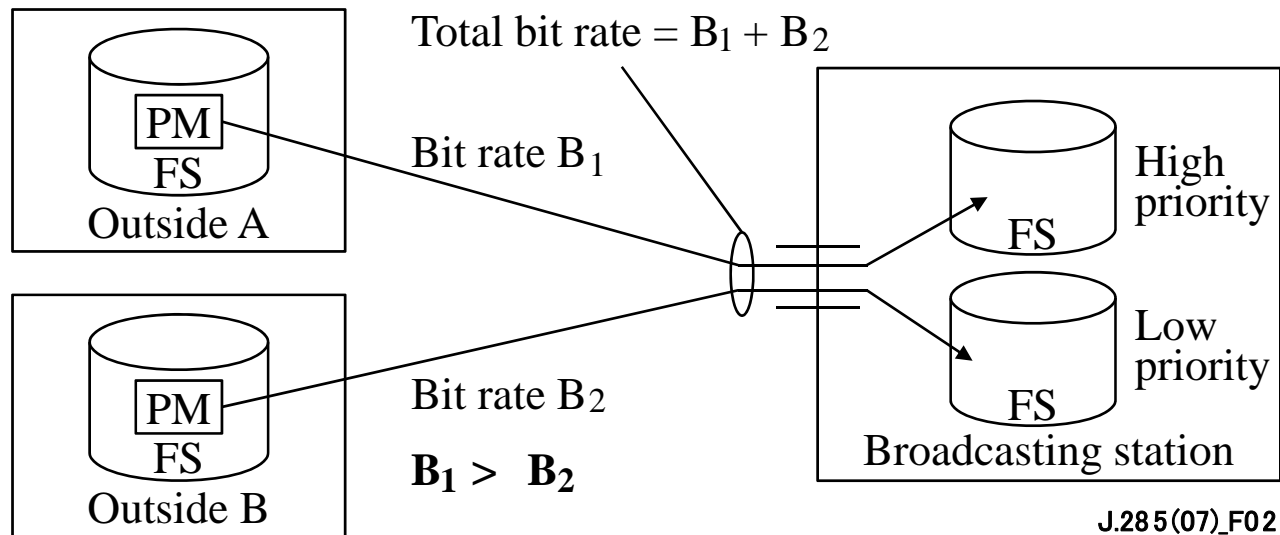
- Terminals
 - STB
 - IP delivery
 - Home network
- Applications
 - API

Use cases

❖ File based workflow

- Assuming stable and fixed line transmission

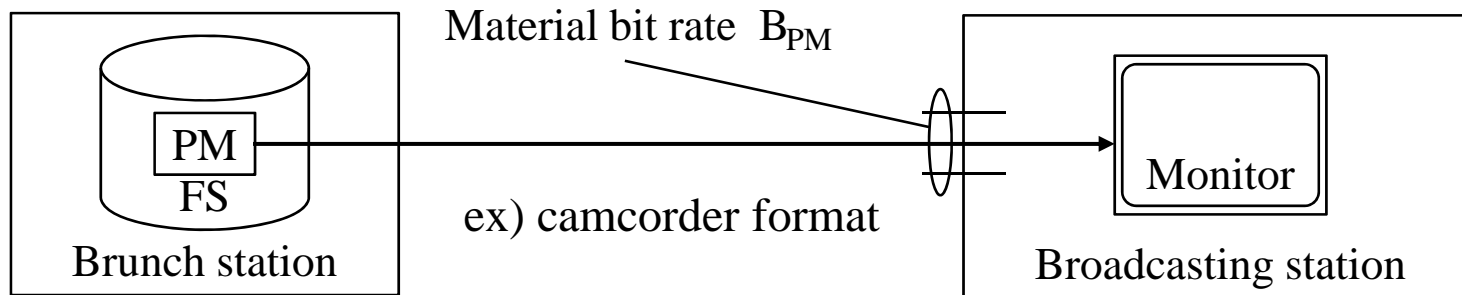
◆ Prioritized file transfer



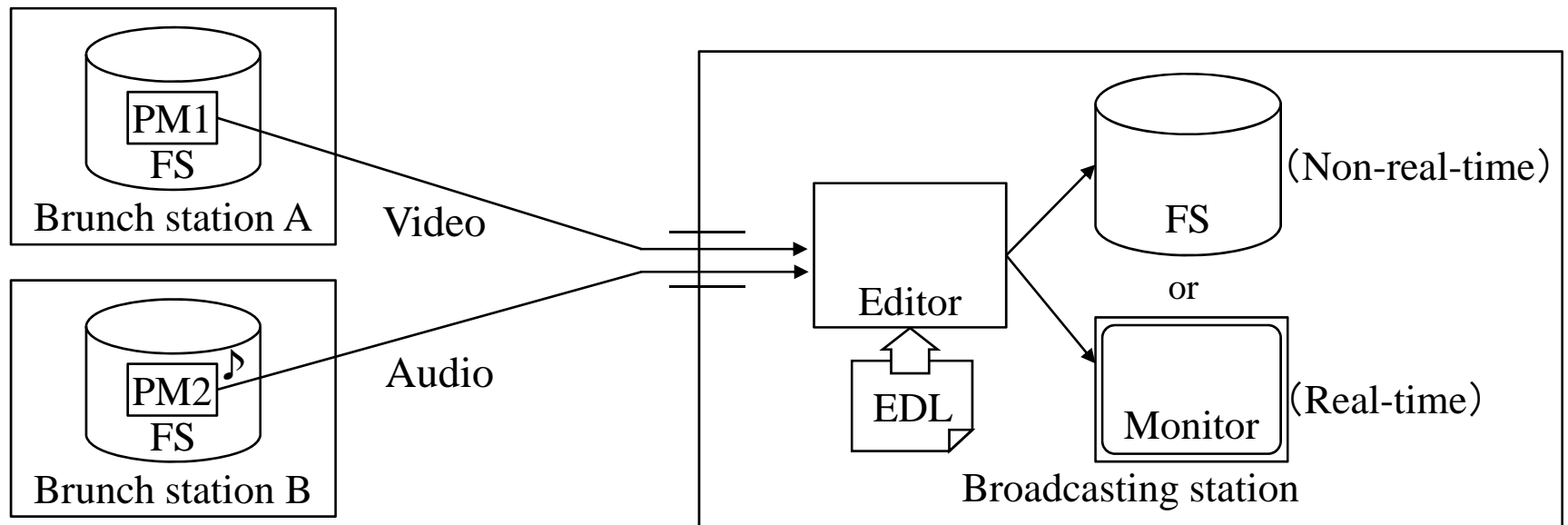
FS: File Server, PM: Program Material

Use cases

◆ Real-time streaming



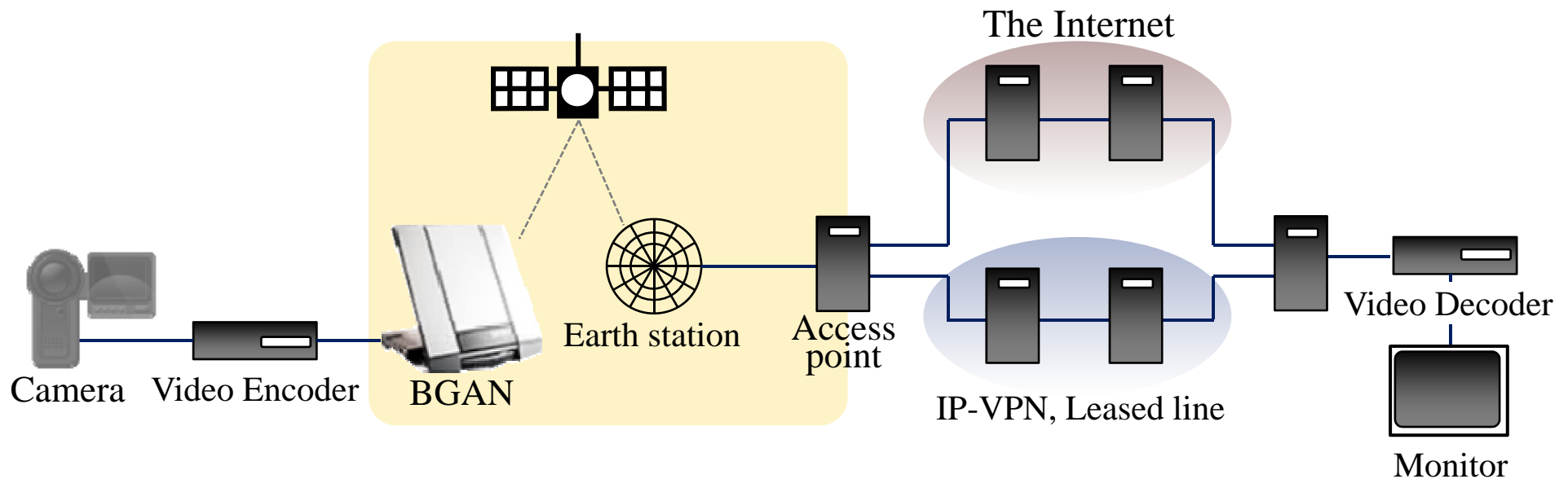
◆ Synchronized transfer for editing



Use cases

❖ Live contribution

- ◆ Should manage unstable and mobile transmission



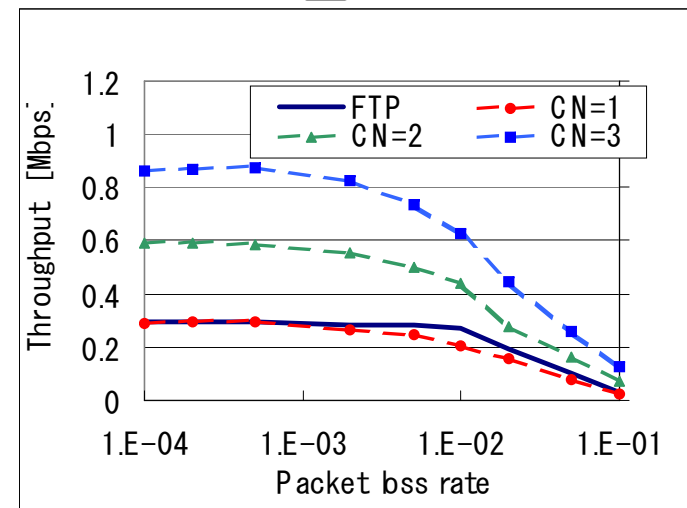
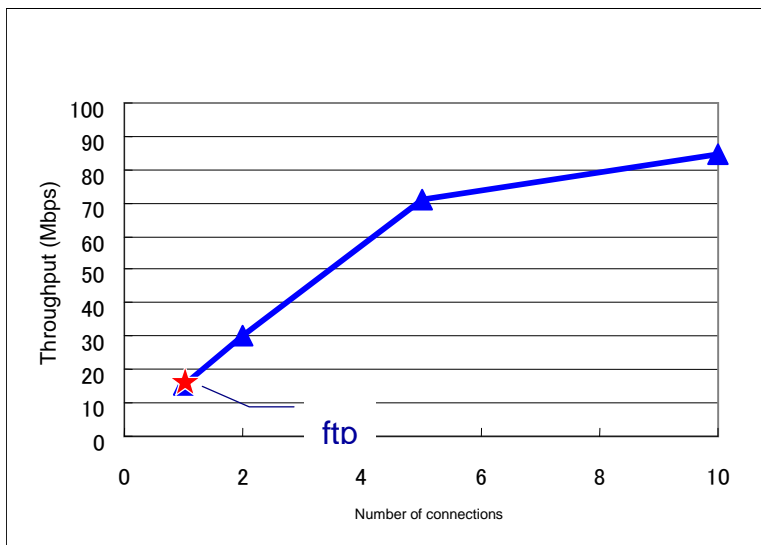
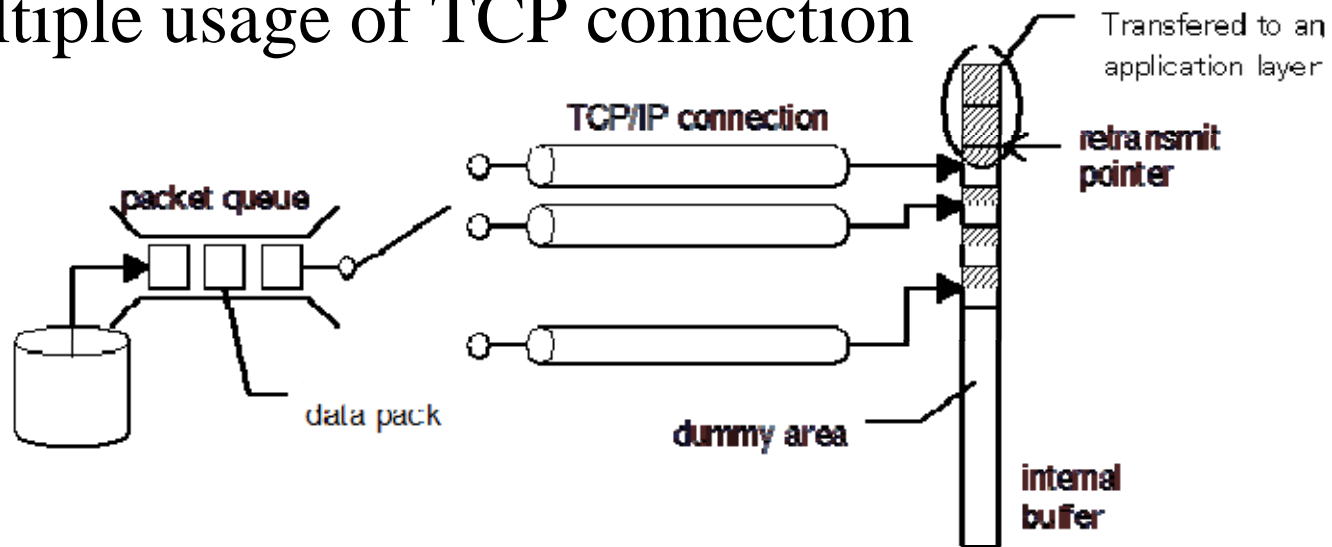
Example configuration to use Inmarsat BGAN

Technical problems

1. Throughput limitation on high delay link
2. Prioritization of file transfer
3. Synchronization of multiple file transfer
4. Managing fluctuation of available throughput
5. Video quality degradation due to low throughput

Solution for 1 (high delay link)

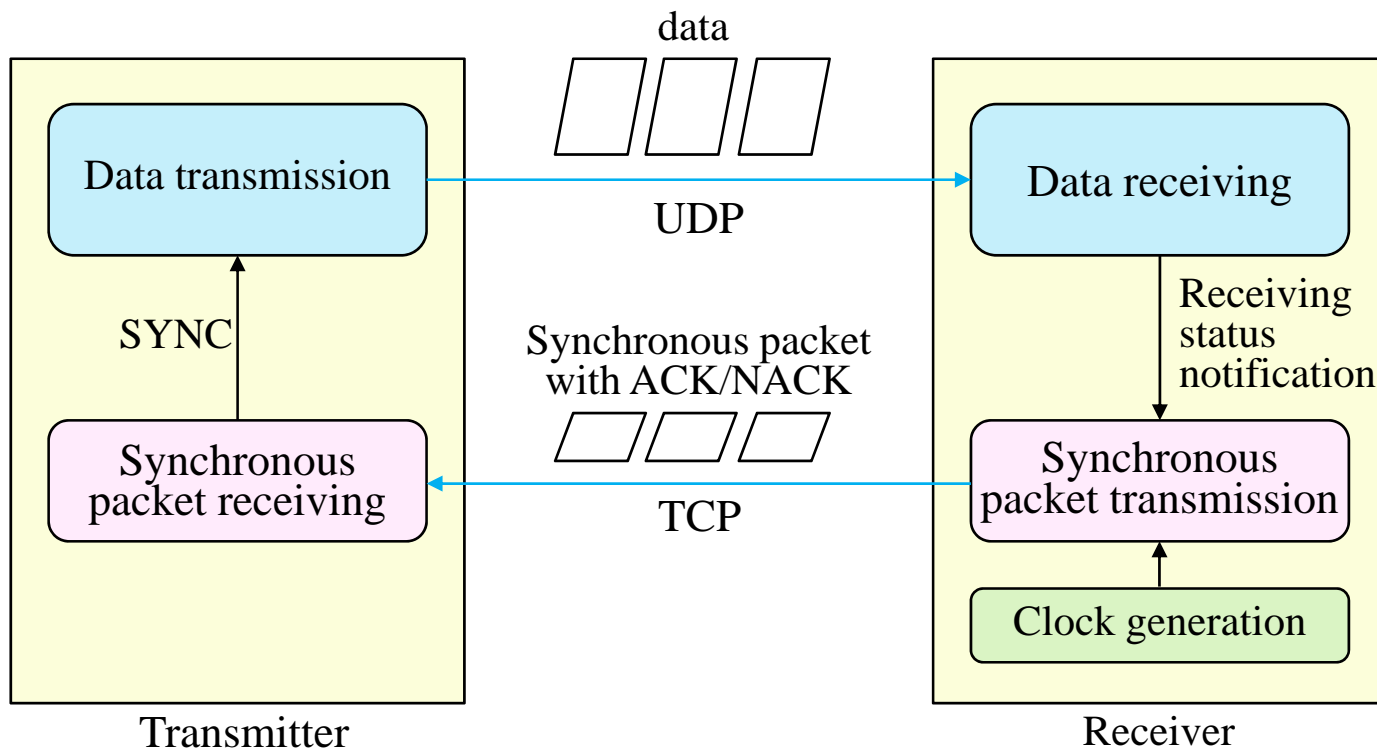
❖ Multiple usage of TCP connection



Solution for 2 and 3 (file transfer flow control)

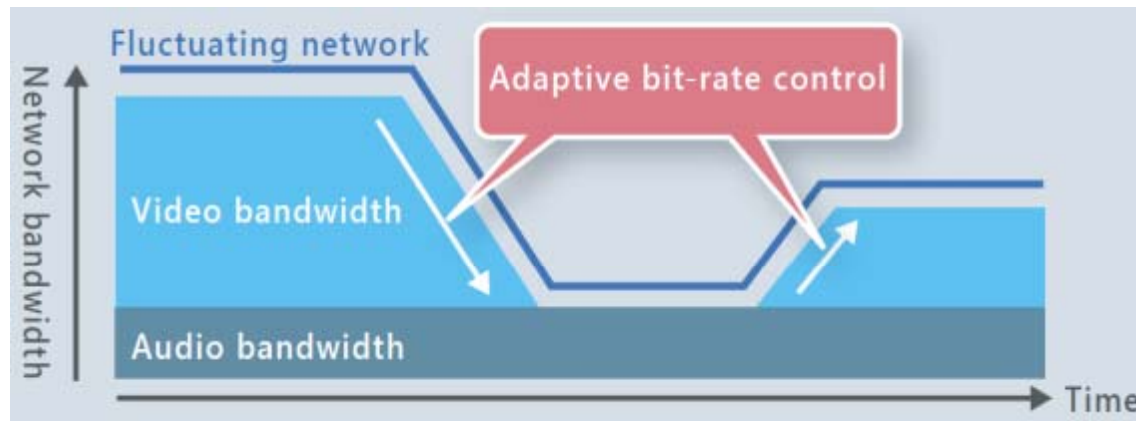
❖ Flow media file transfer protocol

- ◆ Data is sent over UDP
- ◆ Flow control works on TCP

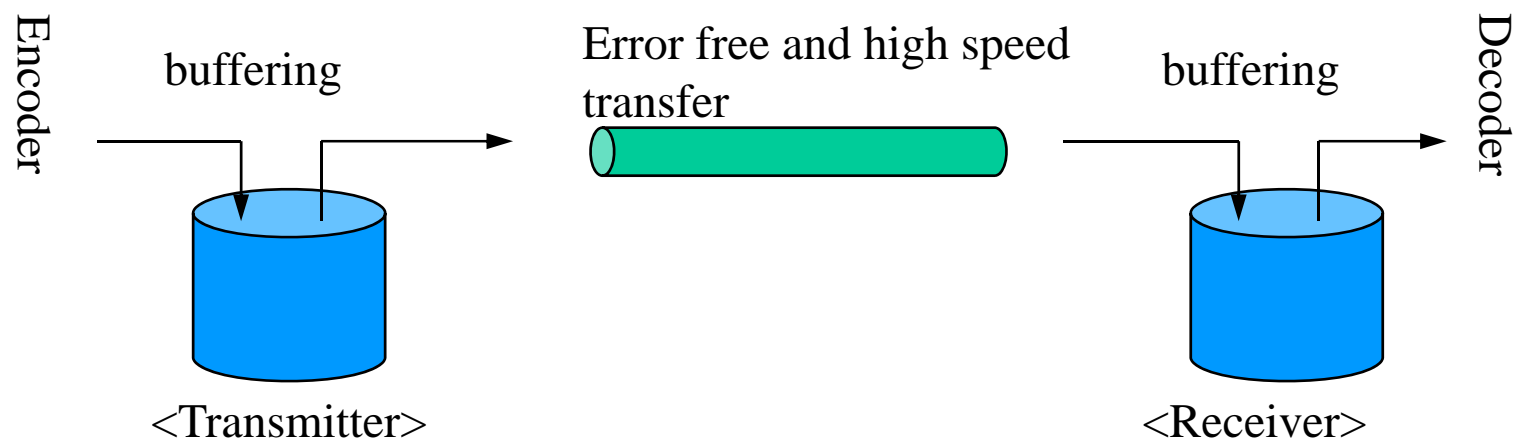


Solution for 4 and 5

❖ 4. Adaptive bit rate



❖ 5. Store-and-forward (Pseudo-streaming)



Implementations

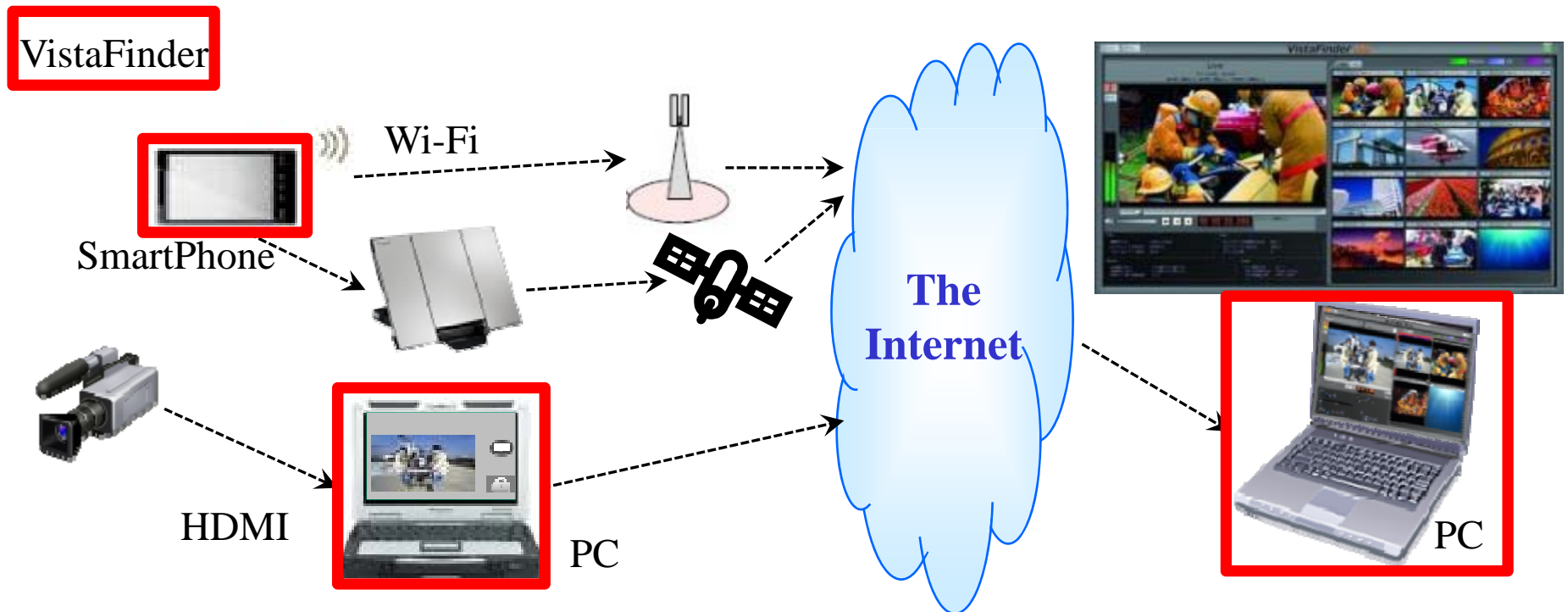
❖ SDK for file based workflow

- ◆ Solution 2 and 3

http://www.nhk.or.jp/str1/flexible/doc_fmftp.html

❖ VistaFinder Mx

- ◆ Solution 1, 4 and 5



VistaFinder Mx-R

Live File TxCtrl Mobile SD HD

Live ON AIR ドライブレコーダ (昼) 送信者: 計 1

A V N/W REC



00:12:49.174
SOURCE: MINUTES SECONDS MILLISECONDS
RECORDING TIME: 00:00:00.000

Video	Audio
画像サイズ 1280 x 720	サンプリング周波数 [kHz] 32.0
ビットレート [kbps] 1588.4	ビットレート [kbps] 33.7
フレームレート [fps] 20.0	チャンネル数 1

Picture	System
画像サイズ 0 x 0	CPU 使用率 [%] 44.6
歪み 0	HDD 空き容量 [GB] 267.1 / 502.1
	メモリ使用量 [GB] 3.2 / 7.8

Network

伝送速度 [kbps] 1424.8 (最小: 576.1, 最大: 2427.1)
応答遅延 [msec] 0.0 (最小: 0.0, 最大: 112.1)
欠陥パケット数 (映像/音声) 28 / 7

00:42 12:49 00:29 01:40 02:52 03:24 00:53 02:11

待機中 [Ch0] 待機中 [Ch1] 待機中 [Ch2]

16:27 2013/09/05

Conclusion

- ❖ Evolution of video production workflow is still on-going reflecting the advancement of transmission and computation infrastructure
- ❖ Telecom carrier is continuously required to provide reliable transmission services as well as highly efficient cloud services to support the new workflow including file-based IP services