Patent Pools and Essential Technology:

Who Gets to Swim in the Pool?

Robert R. Sachs

Center for the Protection of Intellectual Property
Sixth Annual Fall Conference

Patent Pool Defined

- "The aggregation of intellectual property rights which are the subject of cross-licensing, whether they are transferred directly by patentee to licensee or through some medium, such as a joint venture, set up specifically to administer the patent pool." Joel I. Klein, DOJ

- "A patent pool is an arrangement among multiple patent holders to aggregate their patents. A typical pool makes all pooled patents available to each member of the pool. Pools also usually offer standard licensing terms to licensees who are not members of the pool. In addition, the typical patent pool allocates a portion of the licensing fees to each member according to a pre-set formula or procedure." Robert P. Merges

Potted History of Patent Pools

- Historical patent pools
  - 1856: “Sewing Machine Combination,” for sewing machines using lockstitch sewing
  - 1917: “Manufacturers' Aircraft Association,” for aircraft controls
  - Dozens of patent pools between 1930 and 1990
    - hydraulic pumps, machine tools, Philips screws, variable condensers to select radio stations, wrinkle finishes, enamels and paints, fuse cutouts, furniture slip covers
- Modern patent pools
  - DOJ “Business Review Letters”
    - MPEG-2 (1997)
    - 3C DVD (1998) and 6C DVD (1999)
    - 3G (2002)
    - RFID Consortium LLC (2008)
    - IPXI Holdings (2013)
    - www.justice.gov/atr/business-review-letters-and-request-letters
  - DOJ “Antitrust Guidelines for Licensing Intellectual Property” (1995, 2017)

Examples of Current Patent Pools

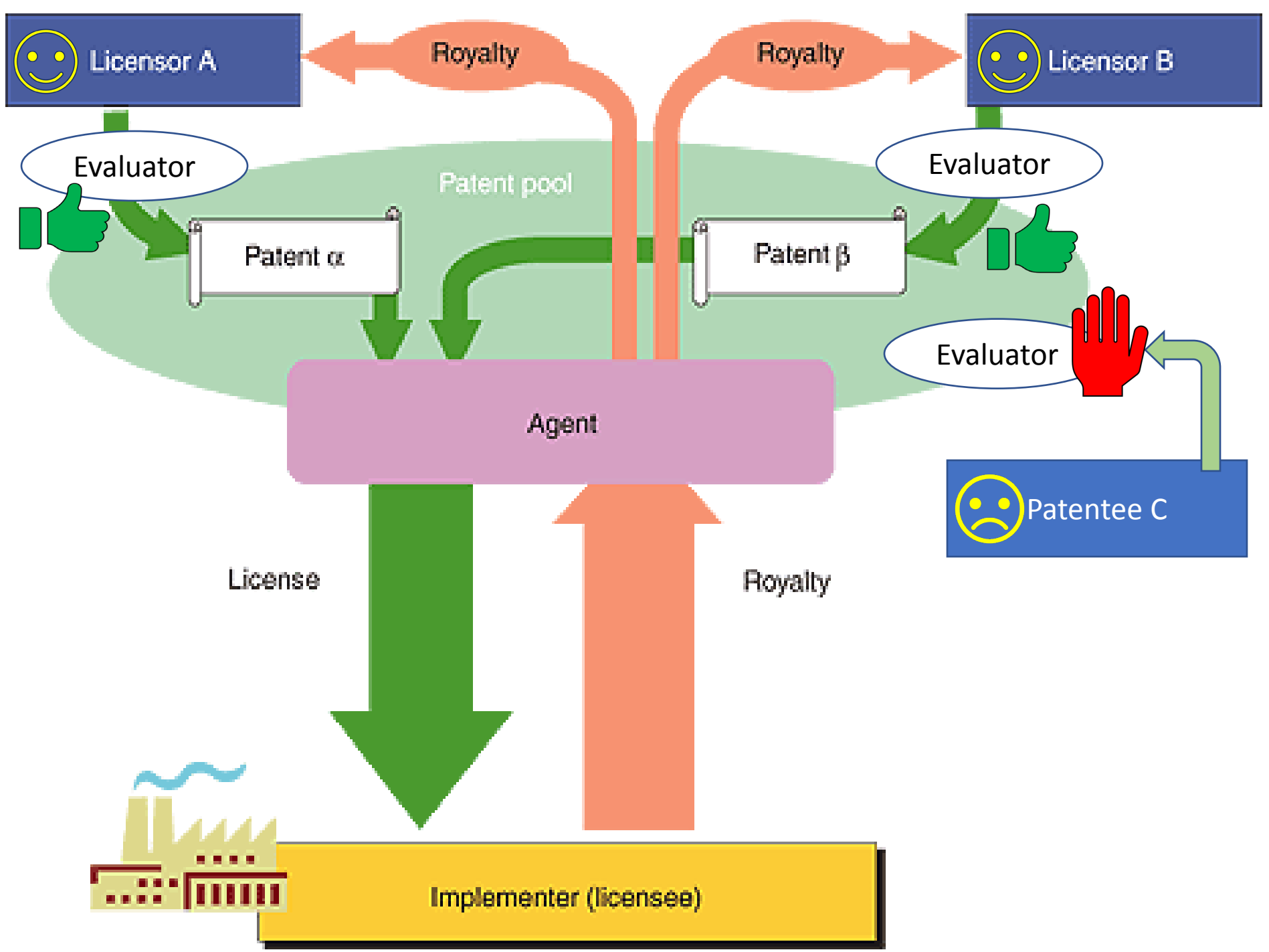
- MPEG-LA
  - AVC/H.264, HEVC
  - DisplayPort, FireWire
  - Librassay®
  - CRISPR-Cas9
- Via Licensing
  - MPEG-4 Audio, MPEG-Surround
  - LTE, W-CDMA, 802.11
  - AGORA-C
- Sisvel
  - MPEG-1, MPEG-2, and MPEG-3 Audio
- VoiceAge
  - AMR Narrowband, Wideband, WB+
  - G.711, G.729

Characteristics of Modern Patent Pools

- Specific technology standard
- Pool patent license is reasonable and non-discriminatory
- Independent expert evaluator to determine "essential" patents
- Patent holders can license outside of pool
- Patent pool administrator handles obtaining licensees and collection/distribution of royalties
- No sharing of competitive information between license holders

Essentiality: Substitutes & Complements

- "Based on your representations to us about the **complementary nature** of the patents to be included in the Portfolio, it appears that the Portfolio is a procompetitive aggregation of intellectual property. **The Portfolio combines patents that an independent expert has determined to be essential to compliance with the MPEG-2 standard**; there is no technical alternative to any of the Portfolio patents within the standard."
- "The continuing role of an independent expert to assess essentiality is an **especially effective guarantor that the Portfolio patents are complements, not substitutes**."
- MPEG-2 Business Review Letter (1997)


Licensor A
Royalty
Royalty
Licensor B
Evaluator
Patent pool
Evaluator
Patent α
Patent β
Evaluator
Agent
Patentee C
License
Royalty
Implementer (licensee)

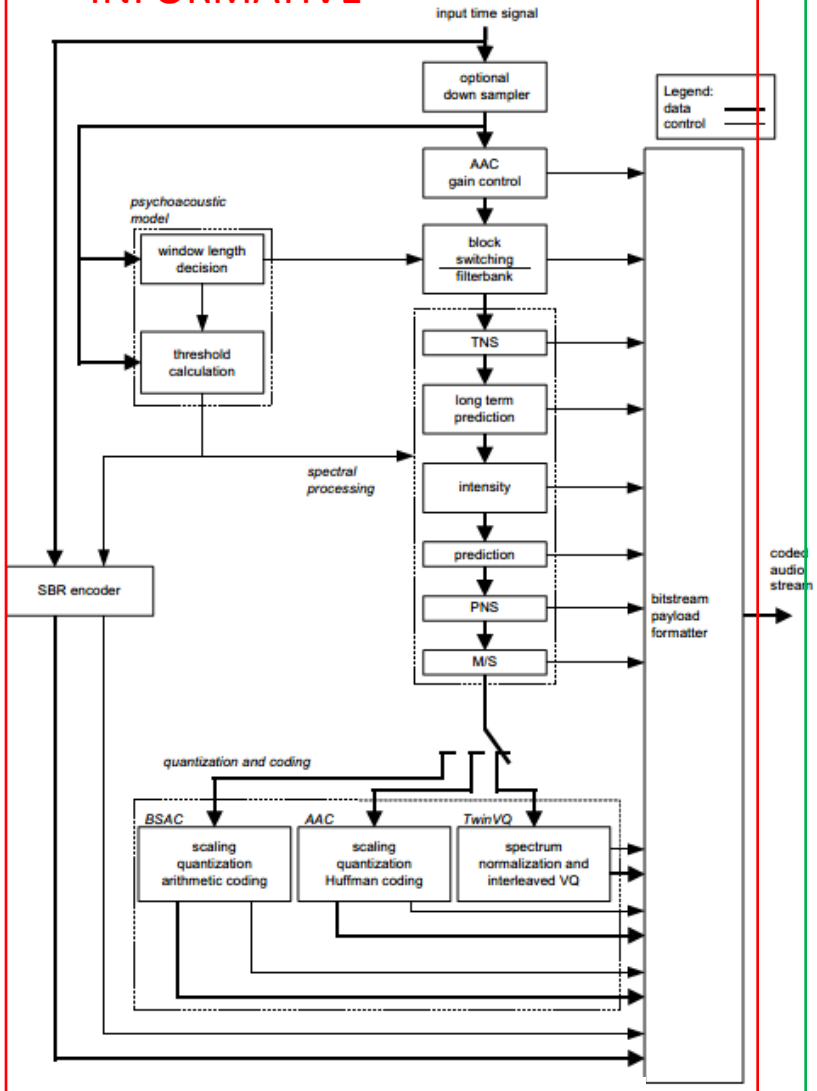
What is Essentiality?

- DOJ allows for different definitions of an "essential" patent
- "Technically essential": MPEG-2
  - "Any Patent claiming an apparatus and/or a method **necessary for compliance** with the MPEG-2 Standard under the laws of the country which issued or published the Patent."
- "Necessary as a practical matter": 3C DVD
  - "those patents which are **necessary as a practical matter for compliance** with the [Standard] specifications. The license, therefore, includes not only all patents **technically necessary to manufacture** a product to the standard specifications, but also **those which a typical licensee is likely to require**."
- "No realistic alternative" to the patent: 6C DVD
- "No economically viable substitutes" for the patent: RFID Consortium

Issues in Patent Evaluations

- Questions of Validity
- Standard of Review and Review Process
- *Normative* vs *Informative* portions of Standards

INFORMATIVE

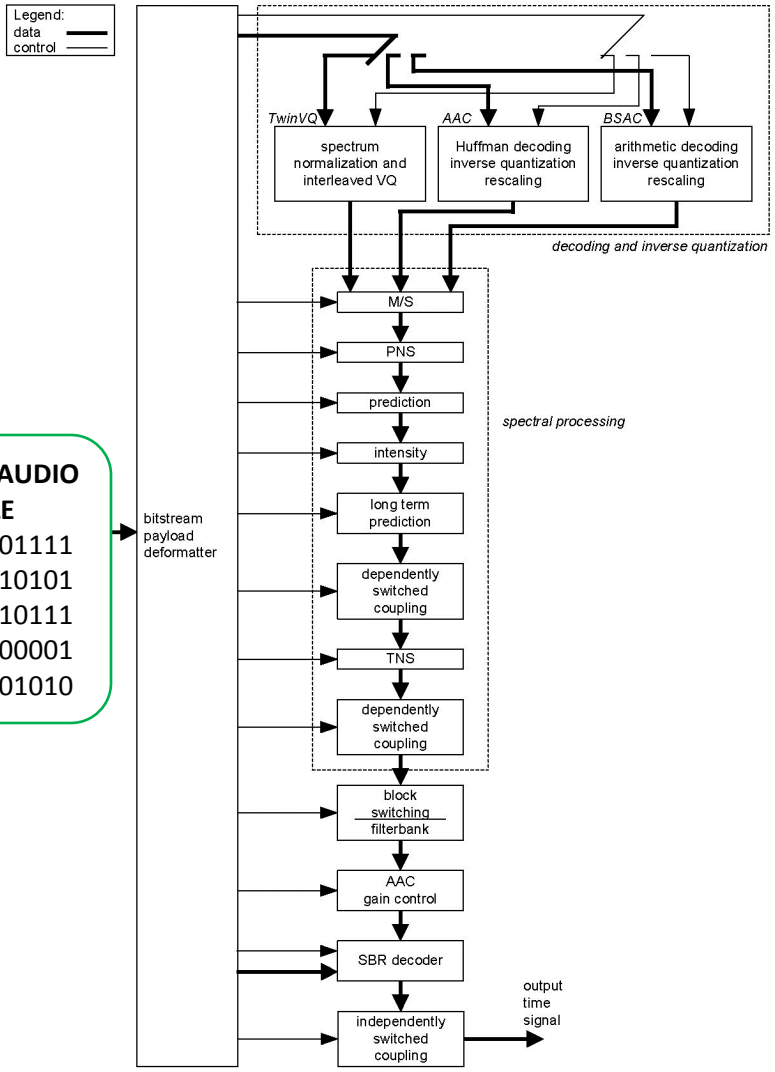


MPEG-4 Audio Encoder

NORMATIVE

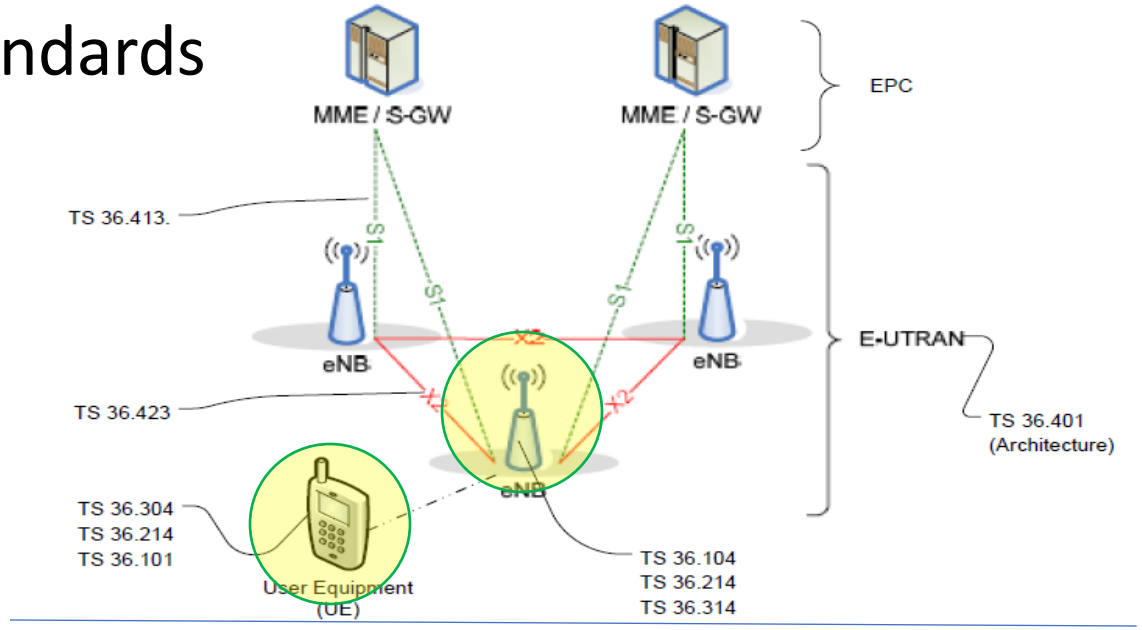
CODED AUDIO FILE

01010101111
00101010101
00001010111
00110100001
10100101010



MPEG-4 Audio Decoder

LTE Standards



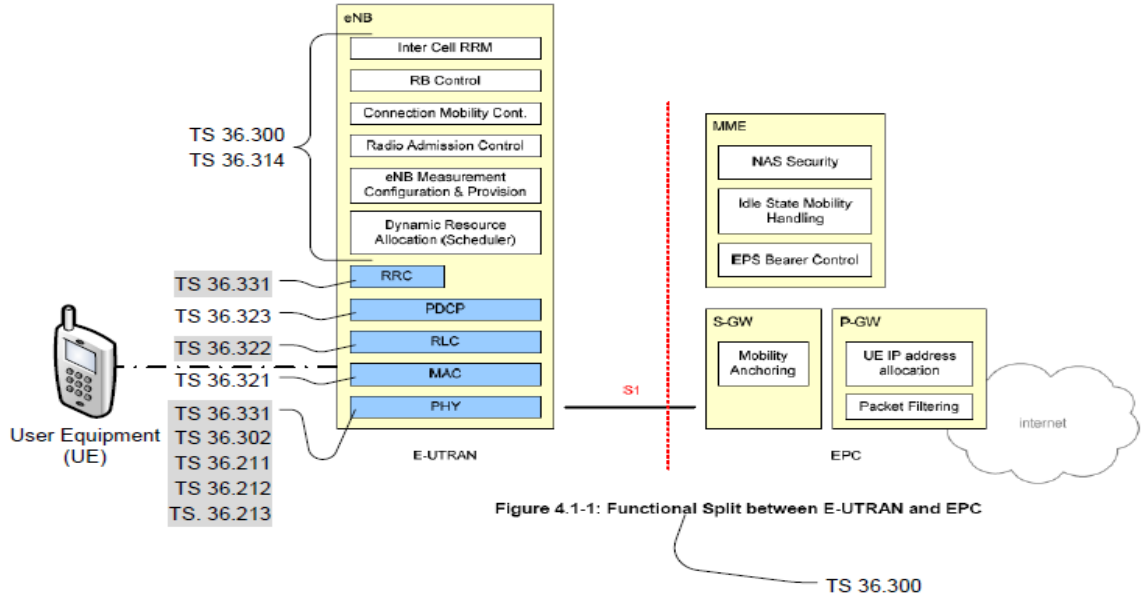
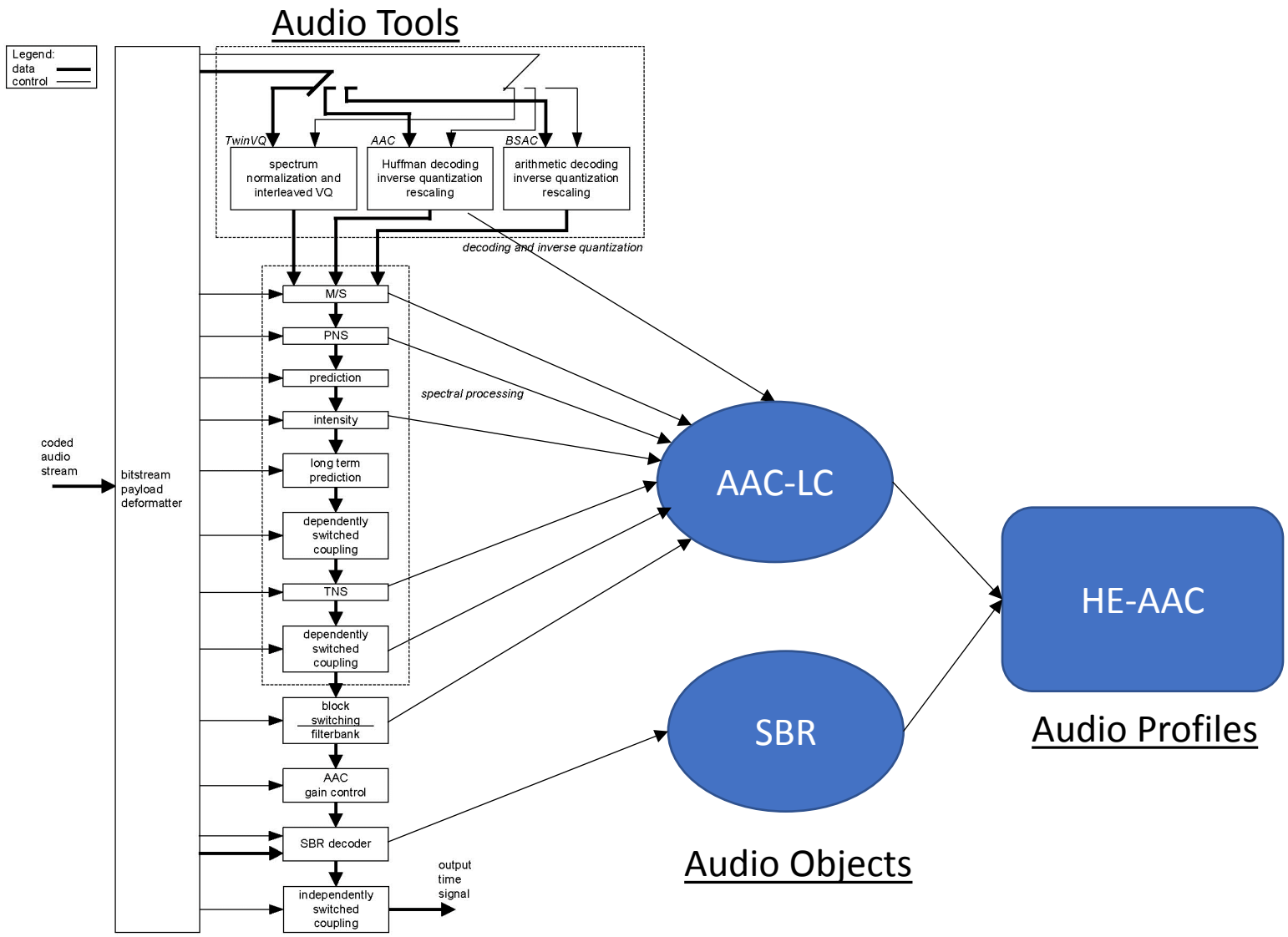


Figure 4.1-1: Functional Split between E-UTRAN and EPC

TS 36.300

Issues in Patent Evaluations

- Optional Features and “Profiles”
- Claims that covers multiple devices


Audio Tools
Legend:
data
control
TwinVQ
AAC
BSAC
spectrum normalization and interleaved VQ
Huffman decoding inverse quantization rescaling
arithmetic decoding inverse quantization rescaling
decoding and inverse quantization
M/S
PNS
prediction
intensity
long term prediction
dependently switched coupling
TNS
dependently switched coupling
block switching filterbank
AAC gain control
SBR decoder
independently switched coupling
spectral processing
coded audio stream
bitstream payload deformatter
output time signal
AAC-LC
SBR
HE-AAC
Audio Profiles
Audio Objects
MPEG-4 Audio Decoder

In order to avoid unwanted noise substitution, the gain values are limited according to the following. Furthermore, the total level of a particular limiter band is adjusted in order to compensate for the energy-loss imposed by the limiter.

$$\mathbf{G}_{Max_{Temp}}(k,l) = \sqrt{\frac{\varepsilon_0 + \sum_{i=\mathbf{f}_{TableLim}(k)-k_x}^{\mathbf{f}_{TableLim}(k+1)-1-k_x} \mathbf{E}_{OrigMapped}(i,l)}{\varepsilon_0 + \sum_{i=\mathbf{f}_{TableLim}(k)-k_x}^{\mathbf{f}_{TableLim}(k+1)-1-k_x} \mathbf{E}_{Curr}(i,l)}} \cdot \mathbf{limGain}(bs\_limiter\_gains), \quad 0 \le k < N_L, 0 \le l < L_E$$

$$\mathbf{G}_{Max}(m,l) = \min\left(\mathbf{G}_{Max_{Temp}}(k(m),l), 10^5\right), \quad 0 \le m < M, 0 \le l < L_E$$

where $k(m)$ is defined by $\mathbf{f}_{TableLim}(k(m)) \le m + k_x < \mathbf{f}_{TableLim}(k(m)+1)$,

and where $\mathbf{limGain} = [0.70795, 1.0, 1.41254, 10^{10}]$, and where $\varepsilon_0 = 10^{-12}$.

The additional noise added to the HF generated signal is limited in proportion to the energy lost due to the limitation of the gain values, according to the following:

$$\mathbf{Q}_{M_{Lim}}(m,l) = \min\left(\mathbf{Q}_M(m,l), \mathbf{Q}_M(m,l) \cdot \frac{\mathbf{G}_{Max}(m,l)}{\mathbf{G}(m,l)}\right), \quad 0 \le m < M, 0 \le l < L_E$$

The gain values are limited according to the following:

$$\mathbf{G}_{Lim}(m,l) = \min\left(\mathbf{G}(m,l), \mathbf{G}_{Max}(m,l)\right), \quad 0 \le m < M, 0 \le l < L_E$$

As mentioned above, the limiter is compensated for by adjusting the total gain for a limiter band, in proportion to the lost energy due to limitation. This is calculated according to the following:

$$\mathbf{G}_{BoostTemp}(k,l) = \sqrt{\frac{\varepsilon_0 + \sum_{i=\mathbf{f}_{TableLim}(k)-k_x}^{\mathbf{f}_{TableLim}(k+1)-1-k_x} \mathbf{E}_{OrigMapped}(i,l)}{\varepsilon_0 + \sum_{i=\mathbf{f}_{TableLim}(k)-k_x}^{\mathbf{f}_{TableLim}(k+1)-1-k_x} \left(\mathbf{E}_{Curr}(i,l) \cdot \mathbf{G}_{Lim}^2(i,l) + \mathbf{S}_M^2(i,l) + \delta(\mathbf{S}_M(i,l),l) \cdot \mathbf{Q}_{M_{Lim}}^2(i,l)\right)}}$$

for $0 \le k < N_L, 0 \le l < L_E$ where, $\delta(\mathbf{S}_M(i,l),l) = \begin{cases} 0 & , \mathbf{S}_M(i,l) \ne 0 \; OR \; l = l_A \; OR \; l = l_{APrev} \\ 1 & , otherwise \end{cases}$.

The compensation, or boost factor, is limited in order not to get too high energy values, according to:

$$\mathbf{G}_{Boost}(m,l) = \min\left(\mathbf{G}_{Boost_{Temp}}(k(m),l), 1.584893192\right), \quad 0 \le m < M, 0 \le l < L_E$$

where $k(m)$ is defined by $\mathbf{f}_{TableLim}(k(m)) \le m + k_x < \mathbf{f}_{TableLim}(k(m)+1)$, and where $\varepsilon_0 = 10^{-12}$.

This compensation is applied to the gain, the noise floor scalefactors and the sinusoid levels, according to below.

$$\mathbf{G}_{LimBoost}(m,l) = \mathbf{G}_{Lim}(m,l) \cdot \mathbf{G}_{Boost}(m,l), \quad 0 \le m < M, 0 \le l < L_E$$

=

"deriving gain factors for at least one of the plurality of frequency bands, the gain factors determined based on the amplitude scale factors;"