CCITT Study Group XV Document #124
Working Party XV/1
Specialists Group on Coding for Visual Telephony

Source: British Telecom, GEC

Title: Intellectual Property Considerations

There have been discussions at a number of specialists group meetings concerning patents and intellectual property rights.

In an attempt to clarify the situation we asked a patent expert to examine the reference model and report whether there were any applicable patents. A summary of his findings is attached to this document. It can be seen that a number of patents appear to cover some fundamental parts of the reference model. In our view the term 'fundamental' includes patents that can be avoided only by using more costly hardware than covered by the patent.

Many members of the group (ourselves included) will be committing considerable resources to the development of experimental hardware within the next 12 months, and on product development once the final specification is available in 1988. Whilst there is always a risk in any product development that one may unknowingly contravene a patent, particularly one that is not yet in the public domain, it would be unwise to ignore existing patents and purposefully take the risk that the assignee will grant acceptable licence terms at some time in the future.

It is therefore our opinion that the situation with any patents that already exist, and that are clearly fundamental to any new recommendation, should be clarified as a matter of urgency. The matter should not be left in abeyance until the end of the study period as many of our organisations will have committed significant resources to hardware development by this time.

We propose that holders of such patents be formally asked to clarify their position on any patents held, and to make a clear policy statement as to whether non-discriminatory licences will be made available. Furthermore they should be asked to state precisely the terms of such licences (royalty fees etc).

In the event that these terms are not commercially acceptable and that no such arrangement can be negotiated by 1st October 1986, then it is our opinion that an alternative algorithm should be adopted where it is possible to clarify the IP situation at an early stage.

We also propose that the same criteria be applied to the improvements that will be made to the basic reference model over the coming months.

384 kBIT CODEC - Patents - Progress Report 10th June 1986
Case Ref F45076

A. A computer search was carried out (March 1986) using the Derwent World Patents Index (back to 1973) and the US Patent Claims database (back to 1950).

The search fell into four parts:

1. Hybrid Coding - using keywords:
(interframe OR inter-frame OR conditional replenishment OR conditional regeneration) AND (transform OR transforms OR DCT)
2. DCT - using keywords:
discrete AND transform AND cosine
3. Motion Vector - using keywords:
movement vector OR motion vector
4. Buffer Feedback Quantisation Control - using keywords:
([transform AND coding] OR conditional replenishment OR conditional regeneration) AND (buffer OR store OR storage)

B. The results of the search, after deletion of clearly irrelevant material, were as follows:

1. Hybrid Coding

US 4281344	BELL/Mounts et al
EP 0123456	CLI/Chen et al (=US 4541012)
EP 0084270	CLI/Fralick et al

2. DCT -

GB 2139046	STC/Wong et al
US 4449194	MOTOROLA/Wilhelm
EP 0084270	CLI/Widergren et al
US 4385363	CLI/Fralick et al
EP 0154340	CIT ALCATEL/Arnould
EP 0154341	CIT ALCATEL/Arnould

also six US NAVY patents not considered

3. Motion Vector -

EP 0160547	NEC/Furukawa
EP 0159506	FUJITSU/Matsuda et al
EP 0150935	NEC/Ohki
EP 0137314	MITSUBISHI/Murakami et al
GB 2144301	NEC/Furukawa
GB 2134344	THOMSON CSF/Richard
GB 2050752	NIPPON HOSO KYOKAI/Ninomiya et al (=US 4307420)
US 4460923	NEC/Hirano et al

4. Buffer Feedback Quantisation Control -

US 4394774	CLI/Widergren et al
US 4302775	CLI/Widergren et al
US 4225885	US PHILIPS CORP/Lux et al

also seven AT&T patents not considered

/C.

C. Analysis (significant points in bold type)

1. Hybrid Coding

Bell/Mounts US patent 4281344 concerns, like the model, a system where conversion to the transform domain follows the taking of interframe differences, but is specific to those where small or non-zero interframe difference values are altered (e.g. by substituting an adjacent nonzero value) and certain transform coefficients are not transmitted (e.g. those which are, as a result of the substitution, the same as the others). Side information identifies the substituted terms.

CLI/Chen et al European patent application 0123456 concerns systems in which conversion to the transform domain precedes the taking of differences and is therefore not relevant.

CLI/Fralick et al European patent application 0084270 has (claim 1) a very broad claim covering any system in which interframe differencing precedes the transform operation and absolute values of the coefficients are sent. Strictly, your model would infringe this claim since though it normally sends differences it would send absolute values at start-up, on scene changes and during "quiet" periods. This claim will be valid only if it is novel and inventive (i.e. not obvious) over prior publications which include Mounts 4281344 above. I would need to investigate further before giving a firm opinion.
Claim 2 et seq concern a specific method of encoding transform coefficients where different code tables are selected depending on a predicted coefficient value.

2. DCT -

I cannot comment on these patents as I have no details as to the kind of DCT coding that you propose.

3. Motion Vector -

NHK/Ninomiya et al GB patent 2050752B acknowledges as known an interframe coding system in which a derived motion vector is used to compensate the predicted signal, and also transmitted to the receiver. The actual invention concerns a logarithmic accumulator prior to the correlation and is presumably not of interest.
All the remaining motion vector patents/applications found in the search were filed after publication of the Ninomiya patent and therefore cannot validly cover this basic concept.
I am checking to locate the source of Ninomiya's "known system" just in case there is an earlier patent not found by the search.

4. Buffer Feedback Quantisation Control -

CLI/Widergren et al US patents 4302775 and 4394774 concern a system in which transform coefficients are, prior to variable length and run-length coding, subjected to a normalisation step which has a normalisation factor controlled on the basis of the fill state of an output buffer. The converse process follows at the receiver. This would seem to be very close to what you propose.

US Philips Corp/Lux et al US patent 4225885 concerns a transform coding system with adaptive coefficient quantisation which operates on several sequence (sequency?) classes of coefficients in dependence on the number of coefficients within the class which exceed a threshold value.