Multimedia issues : Industry perspective (part I)

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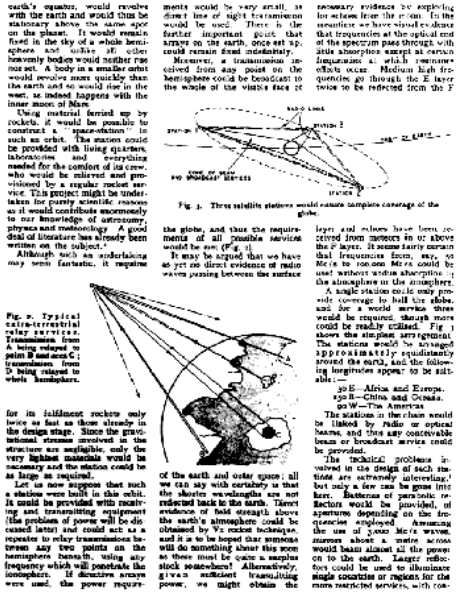
>Satellite communications : from Arthur C. Clarke (octobre 1945) to TV distribution and enterprise networks ...



earth's equator, would revolve with the earth and would thus be stationary above the same spot on the planet. It would remain fixed in the sky of a whole hemisphere, and unlike all other heavenly bodies would neither rise nor set. A body in a smaller orbit would revolve more quickly than the earth and so would rise in the west, as indeed happens with the inner moon of Mars.

Using material ferried up by rockets, it would be possible to construct a " space-station " in such an orbit. The station could be provided with living quarters, laboratories and everything needed for the comfort of its crew, who would be relieved and provisioned by a regular rocket service. This project might be undertaken for purely scientific reasons as it would contribute enormously to our knowledge of astronomy, physics and meteorology. A good deal of literature has already been written on the subject.*

Although such an undertaking may seem fantastic, it requires

ments would be very small, as direct line of sight transmission would be used. There is the further important point that arrays on the earth, once set up, could remain fixed indefinitely.

Moreover, a transmission received from any point on the hemisphere could be broadcast to the whole of the visible face of

Fig. 3. Three satellite stations would ensure complete coverage of the globe.

the globe, and thus the requirements of all possible services would be met (Fig. 3).

It may be argued that we have as yet no direct evidence of radio waves passing between the surface

layer and others have been received from meteors in or above the E layer. It seems fairly certain that frequencies from, say, 10 Mc/s to 100 Mc/s could be used without undue absorption in the atmosphere.

A single station could easily provide coverage to half the globe, and for a world service three would be required, though more could be readily utilised. Fig. 3 shows the simplest arrangement. The stations would be arranged approximately equidistantly around the earth, and the following longitudes appear to be suitable:—

30 E—Africa and Europe.
150 E—China and Oceania.
90 W—The Americas.

The stations in the chain would be linked by radio or optical beams, and thus any conceivable beam or broadcast service could be provided.

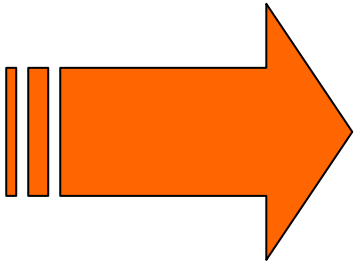
The technical problems involved in the design of such stations are extremely interesting, but only a few can be gone into here. Patterns of parasitic reflectors would be provided, of apertures depending on the frequencies employed. Assuming the use of 3,000 Mc/s waves, mirrors about a metre across would beam almost all the power on to the earth. Larger reflectors could be used to illuminate single countries or regions for the more restricted services, with con-

Fig. 2. Typical extra-terrestrial relay services. Transmission from A being relayed to point B and area C; transmission from D being relayed to whole hemisphere.

for its fulfilment rockets only twice as fast as those already in the design stage. Since the gravitational stresses involved in the structure are negligible, only the very lightest materials would be necessary and the station could be as large as required.

Let us now suppose that such a station were built in this orbit. It could be provided with receiving and transmitting equipment (the problem of power will be discussed later) and could act as a repeater to relay transmissions between any two points on the hemisphere beneath, using any frequency which will penetrate the ionosphere. If directive arrays were used, the power require-

of the earth and outer space; all we can say with certainty is that the shorter wavelengths are not reflected back to the earth. Direct evidence of field strength above the earth's atmosphere could be obtained by V2 rocket techniques, and it is to be hoped that someone will do something about this soon as these must be quite a surplus stock somewhere! Alternatively, given sufficient transmitting power, we might obtain the



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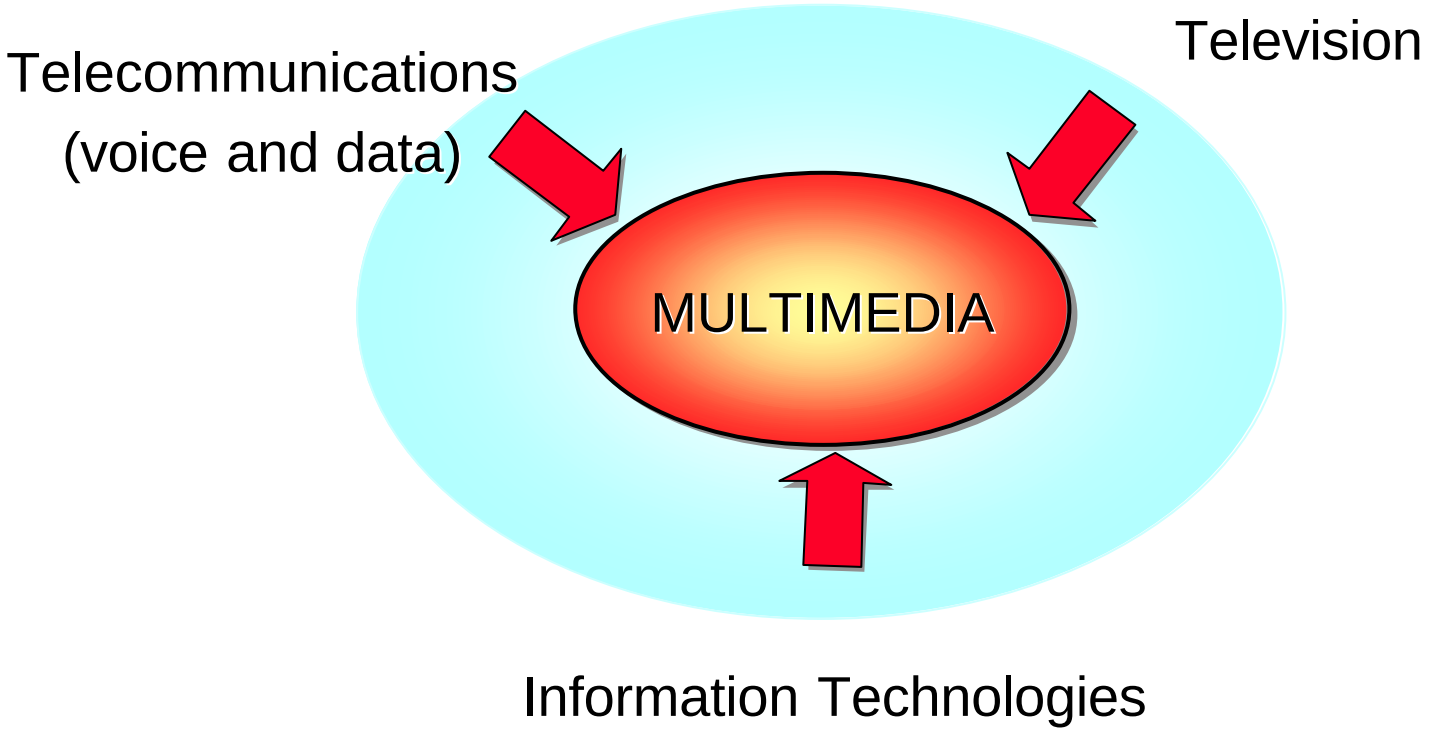
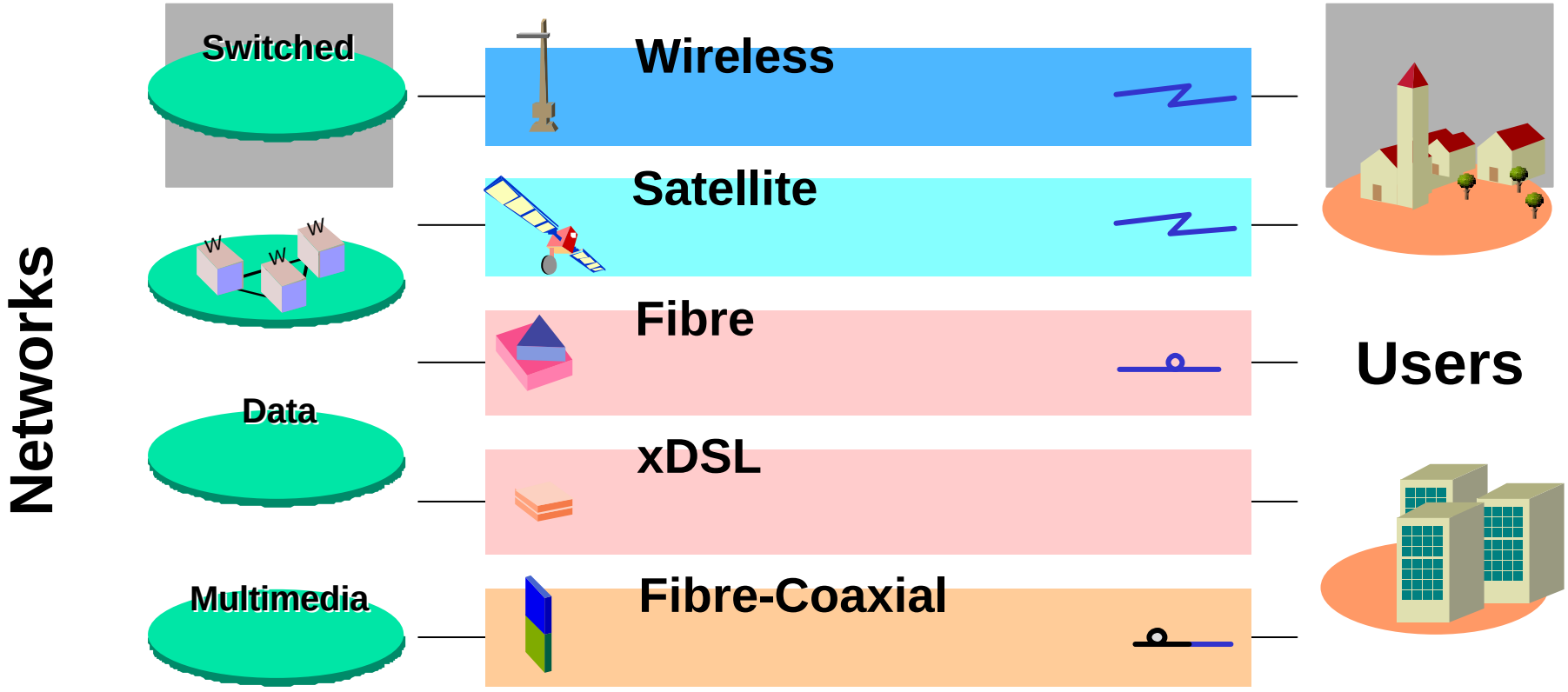
> … and today : Digital Convergence !

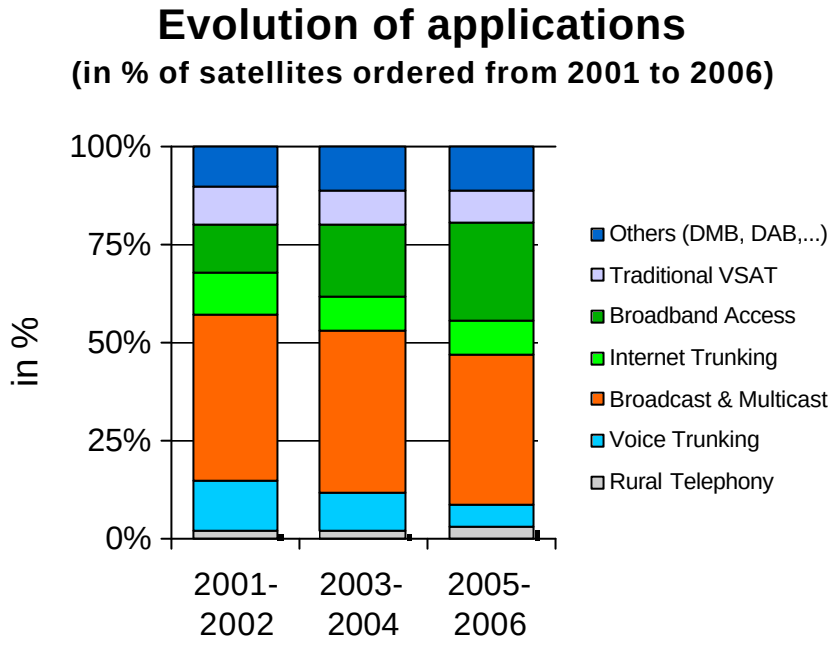


> Satellites serve digital television and telecommunications markets, in synergy with ground networks



>Point to multi-point applications utilize fully the capability of satellites to offer a global coverage, essential to broadcast/multicast services (TV, radio, …)

>Point to point applications utilize satellite global coverage to link any point of the network to any other point.



Satellites have a key role to play in delivering multimedia and Internet services, both in fixed and in mobile environment and both for developed and developing countries

>Evolution of TV services ...

- More of the same : more subscribers (DTH and cable, new TV distribution via DVB-T and DSL, access to collective habitat), more TV (HDTV)
- Interactive services : varied in nature, with different potential technical solutions
- Ease of interaction and higher data rate return channel required
- Four scenarios are being looked at :
  - commercial package of digital TV and BB access
  - technical package of digital TV and BB access in same STB
  - video over DSL
  - satellite return

>… and of Internet access services

- Residential : satellite solution great for multicast (same content to a group of people have the same request, real time or not), not so good for some interactive gaming
- Entreprises : similar services as residential, together with LAN connexion and value added services (content hosting, VPN, …). Same will be true for residential in the future.
- Multi-user : with terrestrial distribution complement, with technologies adapted to institutional or enterprise user (Ethernet, WiFi, …)

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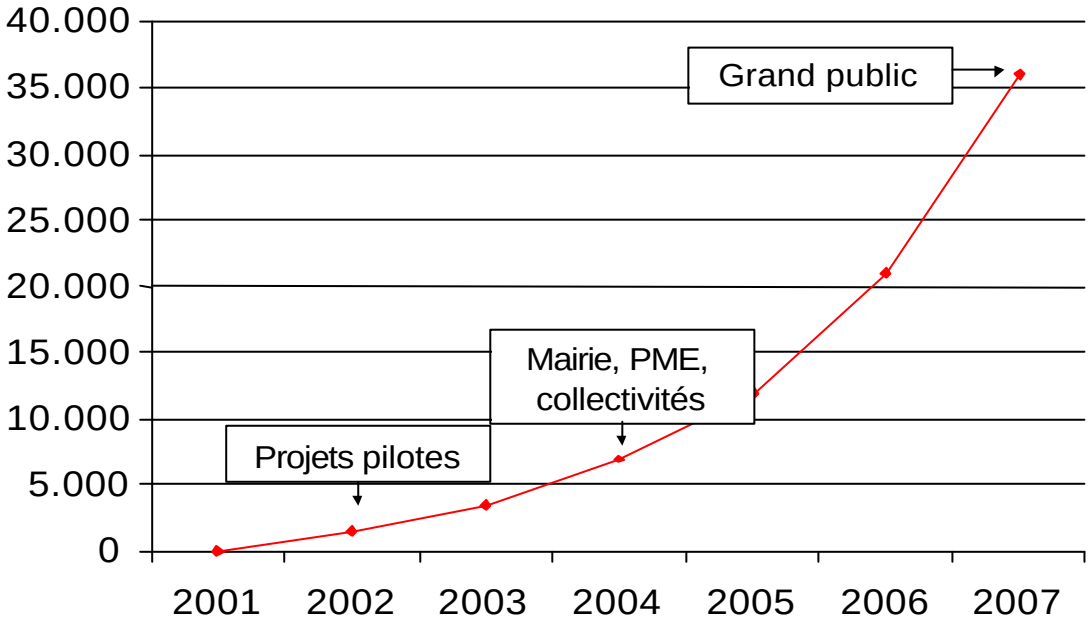
> **Bridging the digital divide :** a major role for international, regional and national institutions
  - e.g. service to French « communes »



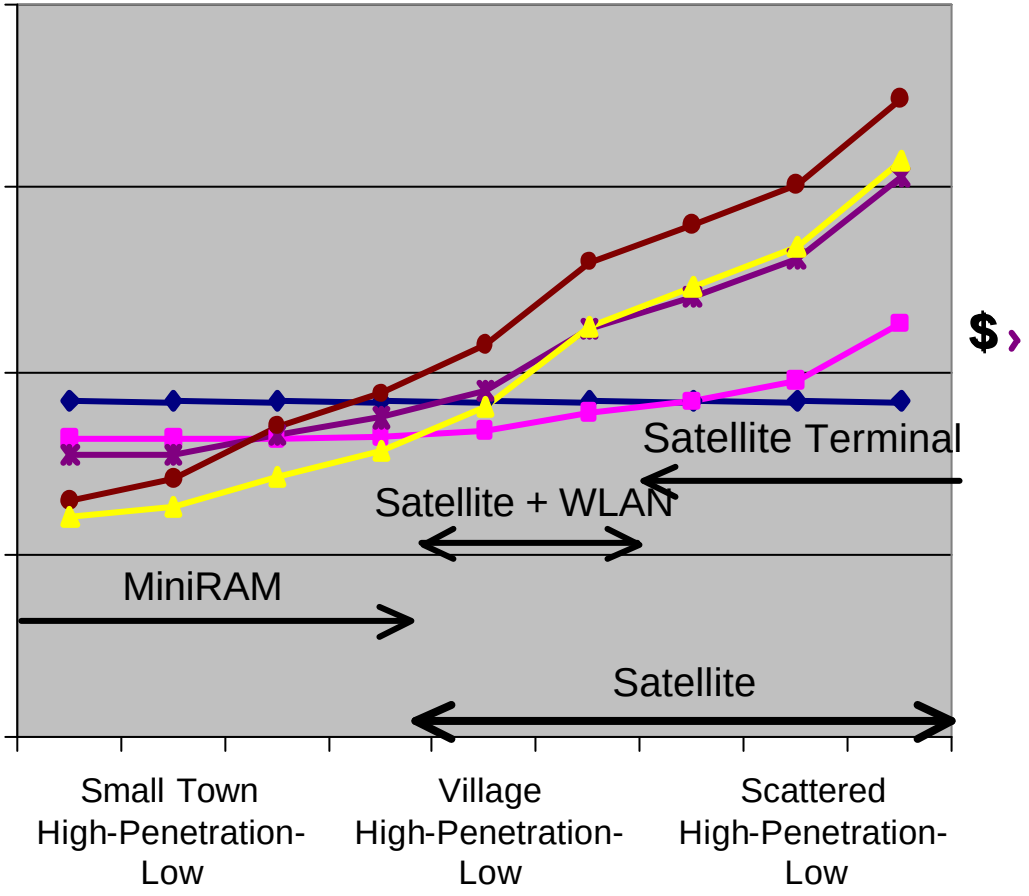
>Extend High Speed Internet to rural :

- 2-way satellite is complementing today the Alcatel portfolio of broadband access solutions: competitive in low density areas

- **For villages, different solutions exist** . Choices depending on CAPEX (DSL) or OPEX (Satellite) focus

- For residential usage, **configuration combining 2-way satellite and W-LAN distribution** is an interesting solution, with a different marketing story directed not to Telco's but more to local authorities

- Single service and management environment. Access network seen as a DSLAM



> **3 needs to support e-policy bridging the digital divide :**

Services, terminals, satellites

- ***Already under way :*** service facilitation through dedicated operators ; DVB-RCS ; multi-spot coverage, Ka-band, processing payload
- ***Next steps :*** institutional usage pull ; next generation satellite TV and BB access terminals ; new architectures