The state of telecom: 
Fundamental drivers of evolution

Andrew Odlyzko
Digital Technology Center
University of Minnesota
http://www.dtc.umn.edu/~odlyzko

Telecom today:

- Still suffering from the overinvestment and malinvestment of the bubble years
- Moving into major restructuring phase

Technology:

- Many choices
- Drive for uniformity (converged network)
- Drive for diversity (walled gardens, security, redundancy, customer-owned networks, outsourcing, ...)

⇒ Likely outcome a multimodal telecom scene, unified by IP layer (in analogy with transportation sector, unified by container)

Long-haul is not where the action is:

- 360 networks transatlantic cable

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction cost</td>
<td>$850 M</td>
</tr>
<tr>
<td>Sale price</td>
<td>$18 M</td>
</tr>
<tr>
<td>Annual operating cost</td>
<td>$10 M</td>
</tr>
<tr>
<td>Lit capacity</td>
<td>192 Gb/s</td>
</tr>
<tr>
<td>Fully lit capacity</td>
<td>1,920 Gb/s</td>
</tr>
<tr>
<td>Ave. transatlantic Internet traffic (mid-2005)</td>
<td>200 Gb/s</td>
</tr>
</tbody>
</table>

Primacy of user needs and user inertia:

Yellow pages example:

- Qwest sale of directory division in 2002 for approx. $7 billion (annual revenues $1.6 billion, margins 63%)
- Current (October 2005) market cap of Qwest: approx. $7 billion

⇒ user inertia often most important factor in business success

User needs: frequently misunderstood by telecom

Example: connectivity and not content primary post-Katrina: what was the main complaint:

- lack of voice telephony?
  or
- lack of TV?
Connectivity: value of connection probably logarithmic in bandwidth

early 19th century "crossed-letter"

Human communication:

One picture is worth a thousand words

Voice is uniquely important for human communication:

Possible enhancements:
1. higher quality
2. segmenting the market through several levels of quality
3. voice mail (to combine power of voice with the non-intrusive advantage of email)
4. emergency capacity boosts through pushing all users to lower levels of quality (and higher compression) instead of complicated prioritization schemes
5. wireless toll-free calls
... but all are being ignored by telecom that is deluded by the content dream

Conclusions:

Promising future for telecom, but
- much turmoil
- likely to have a heterogeneous collection of technologies unified at IP layer
- winners impossible to predict
- success dependent on overcoming false dogmas

Further data, discussions, and speculations in papers and presentation decks at:
http://www.dtc.umn.edu/~odlyzko