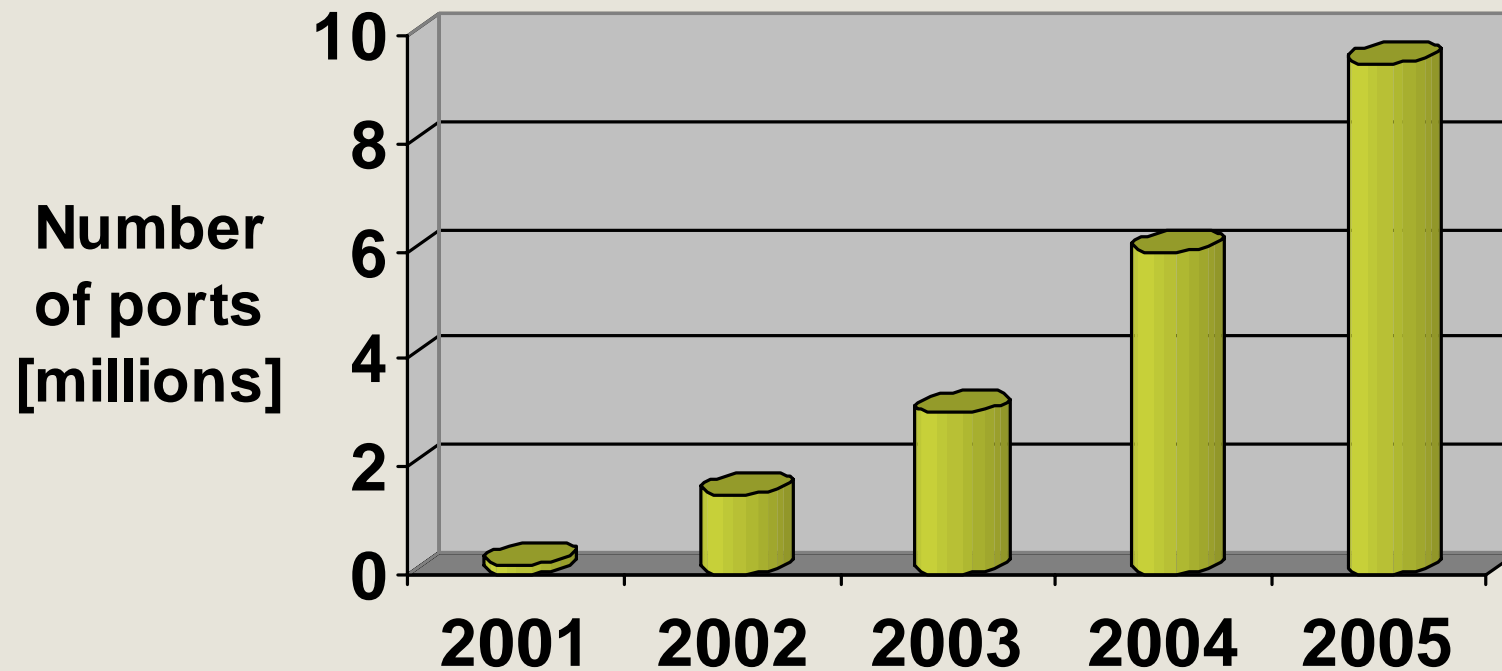


# Applications for 100 Mbps A System Perspective

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## Ethernet Fiber Access Market Outlook 2001 - 2005



Source: Year Outlook, Jefferies & Company, Jan 7<sup>th</sup> 2002

## Installations, some examples

Type of provider	Number of installed lines <2003	Number of installed lines 2003-2004	Type of Installation	Technology
Incumbent A	5 000	100 000	Mass deployment	MMF/SMF, 2-fibers
Incumbent B	1 500	12 000	Mass deployment	SMF, 2-fibers
New Entrant Operator A	5 000		Mass deployment	SMF, 2-fibers
New Entrant Operator B	5 000	30 000	Field Trial	MMF, 2 or 4-fibers
New Entrant Operator C	6 000		Mass deployment	MMF, 2-fibers
Power Utility Company A	1 000	20 000	Mass deployment	MMF, 2 or 4-fibers
Power Utility Company B	2 500	12 000	Mass deployment	SMF, 2 or 4-fibers
Local Utility Company A	2 000	4 000	Mass deployment	MMF 2-fibers

- ✓ Until now mainly MMF due to lack of standards
- ✓ 100 Mbps is the preferred choice in all cases

## 100 Mbps sufficient for short and medium term services

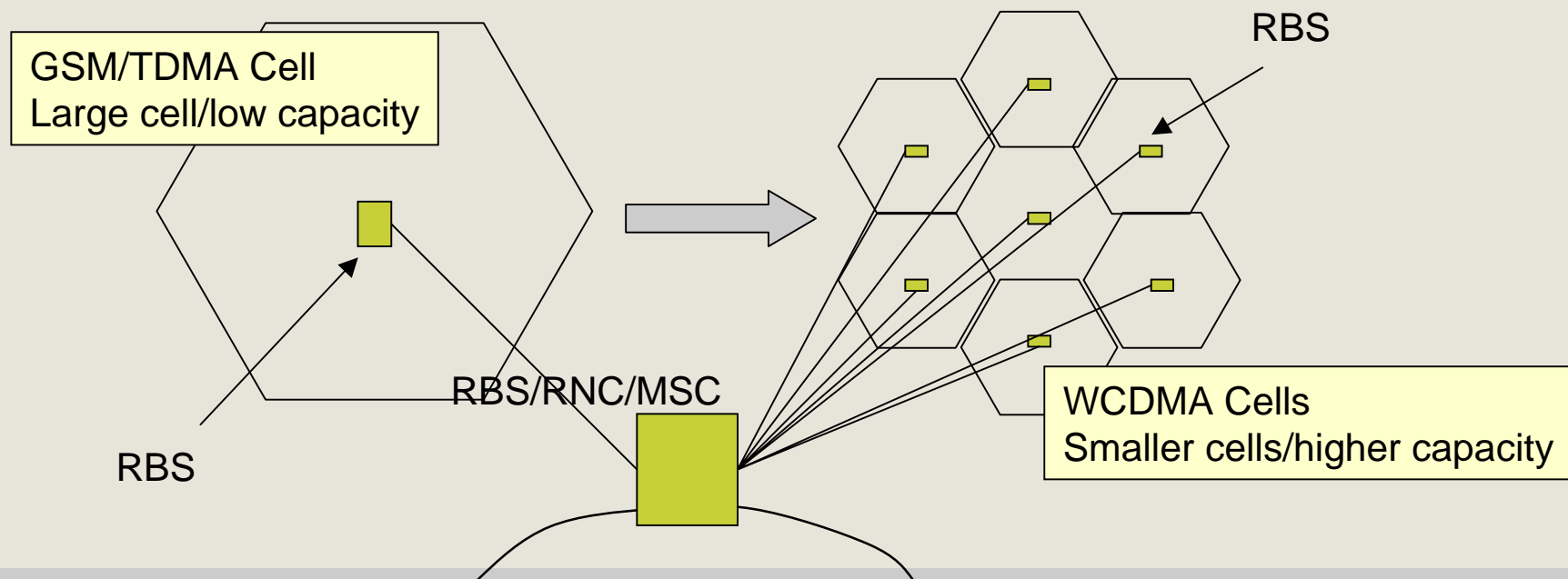
Applications	Example worst case scenario	Generated traffic, (Mbps)
TV & VoD	2 * HDTV (20Mbps/ch) + 2 TV (5Mbps/ch)	50
Video Conferencing	~2Mbps	2
Web browsing & hosting	<10Mbps	10
Streaming sound	CD quality (200kbps)	0,2
Telephony	~100kbps	0,1
<b>Approximate total</b>		<b>62,3</b>

*Traffic generated to/from one subscriber*

Source: 100Base-X over SMF, 5 criteria, IEEE EFM Raleigh Jan. 2002

## Radio Access Networks

- Wire line or  $\mu$ -wave links used for transmission between RBS and RNC/MSC.
- More capacity  $\Rightarrow$  smaller cells  $\Rightarrow$  more transmission



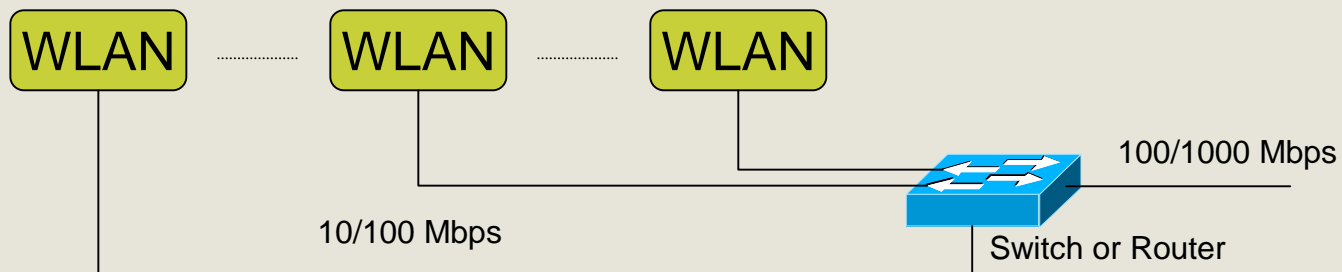
## 2G and 3G Transmission Capacity per Cell

- 2G (GSM, Edge)
  - 8 time slots, 12 TRx per RBS, 14.4 kbps user data
    - 1,4 Mbps + overhead, i.e. up to 2 E1/T1 per cell.
- 3G (WCDMA)
  - Peak allocation 2 Mbps/frequency, max 3x3 configuration
    - 18 Mbps + overhead, i.e. up to 12 E1/T1 per cell

100 Mbps will be enough in the short/medium term

## Wireless-LAN

- 802.11b, 11 Mbps (2.4 GHz, ~5.5 Mbps user data)
- 802.11a, 54 Mbps, (5GHz, ~27 Mbps user data)
- 802.11g, 24 Mbps
- Hiperlan2, 54 Mbps, (~40 Mbps user data)



## Transmission Capacity in Radio Access Network

Service	Required Interface bit-rate	Suitable F/O Interface
WLAN	10-100 Mbps	100 Mbps
2G	4 Mbps	100 Mbps
3G	24 Mbps	100 Mbps

- 3GPP will standardise IP transport
- Fast Ethernet can be a suitable interface

## Summary

- FTTH is happening now, 100 Mbps installations are on-going
- Services do not require more than 100 Mbps today
- Radio applications will not require more than 100 Mbps

100 Mbps will be enough for most applications over the next few years