

Installed Cabling

- forecast to 2005 -

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Acknowledgements

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Base cabling market data was provided by BSRIA.

Big Questions

What kind of cabling for 10GBASE-T?

1. Where are we today in terms of cabling?
2. If 10GBASE-T becomes an approved 802.3 project, what will the installed cabling base look like when it is likely to be approved (early 2006)?

Market Data

- 1. Cable types by Category/Class**
- 2. Installation trends BC to 2005**
- 3. National & regional variations**
- 4. Global installed base to 2005**

Data Sources

BSRIA

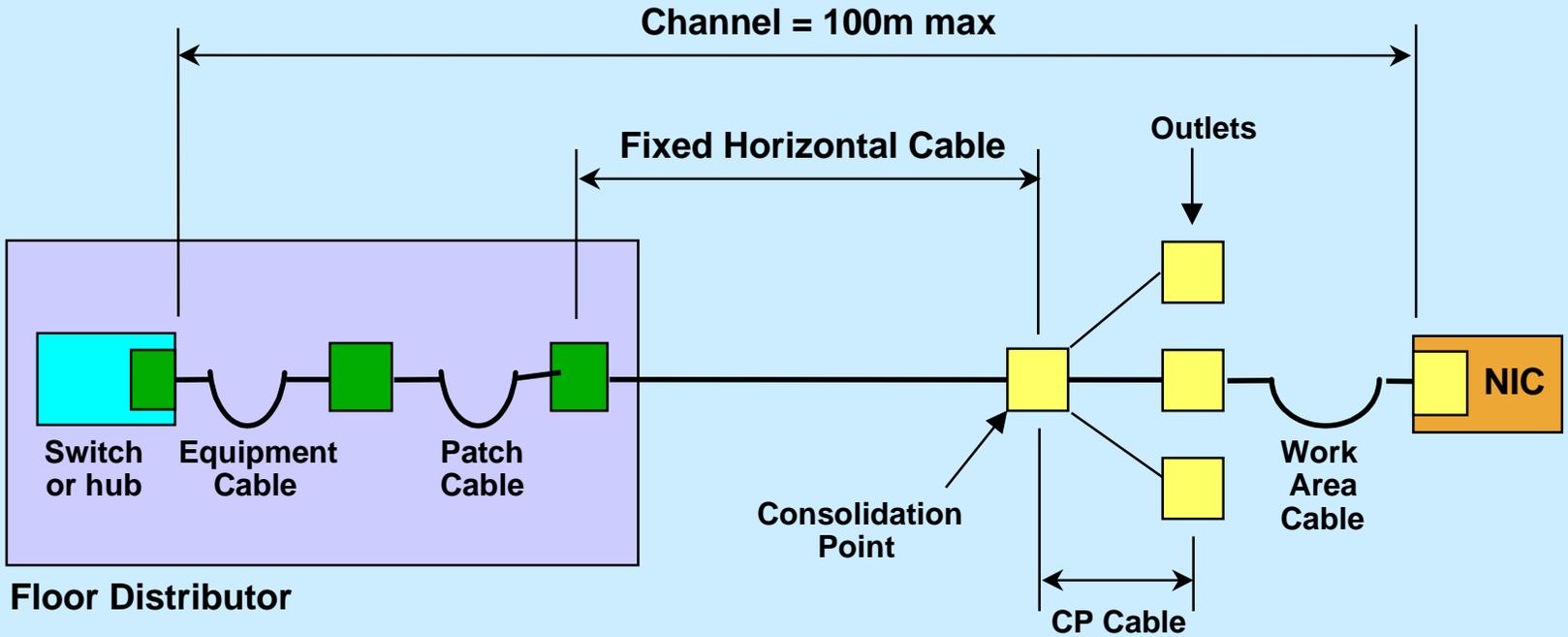
- **Building Services Research and Information Association**
- **Cabling research since 1987**
- **37 countries forecast to 2005**
- **Cat segmentation by country**

Cabling Industry

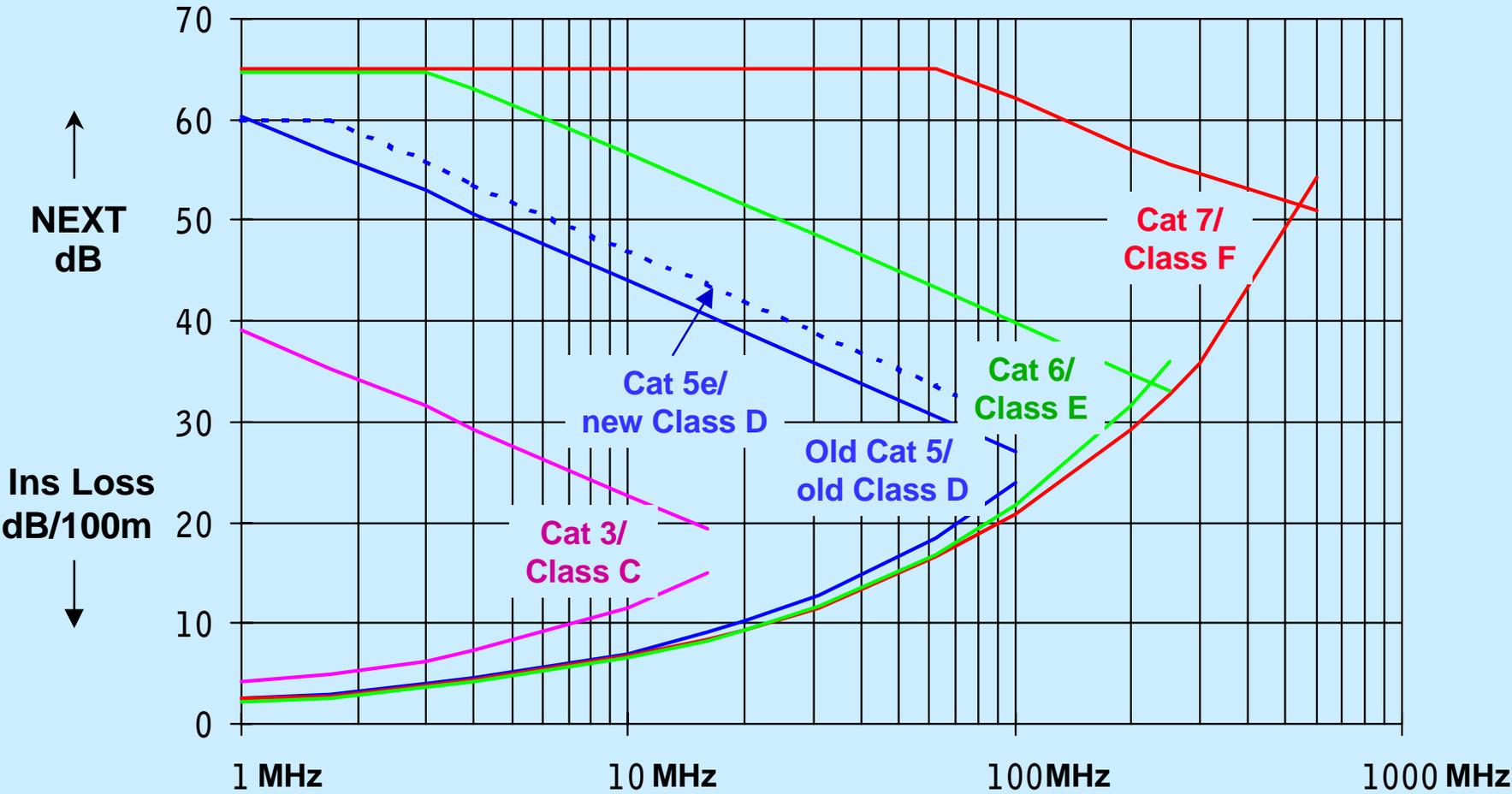
- **providing replacement data**
- **10 suppliers being surveyed (owning 60% market share)**
- **consultants also surveyed**
- **replacement rate guide now / detailed data in March 2003**

Types of Copper Cabling

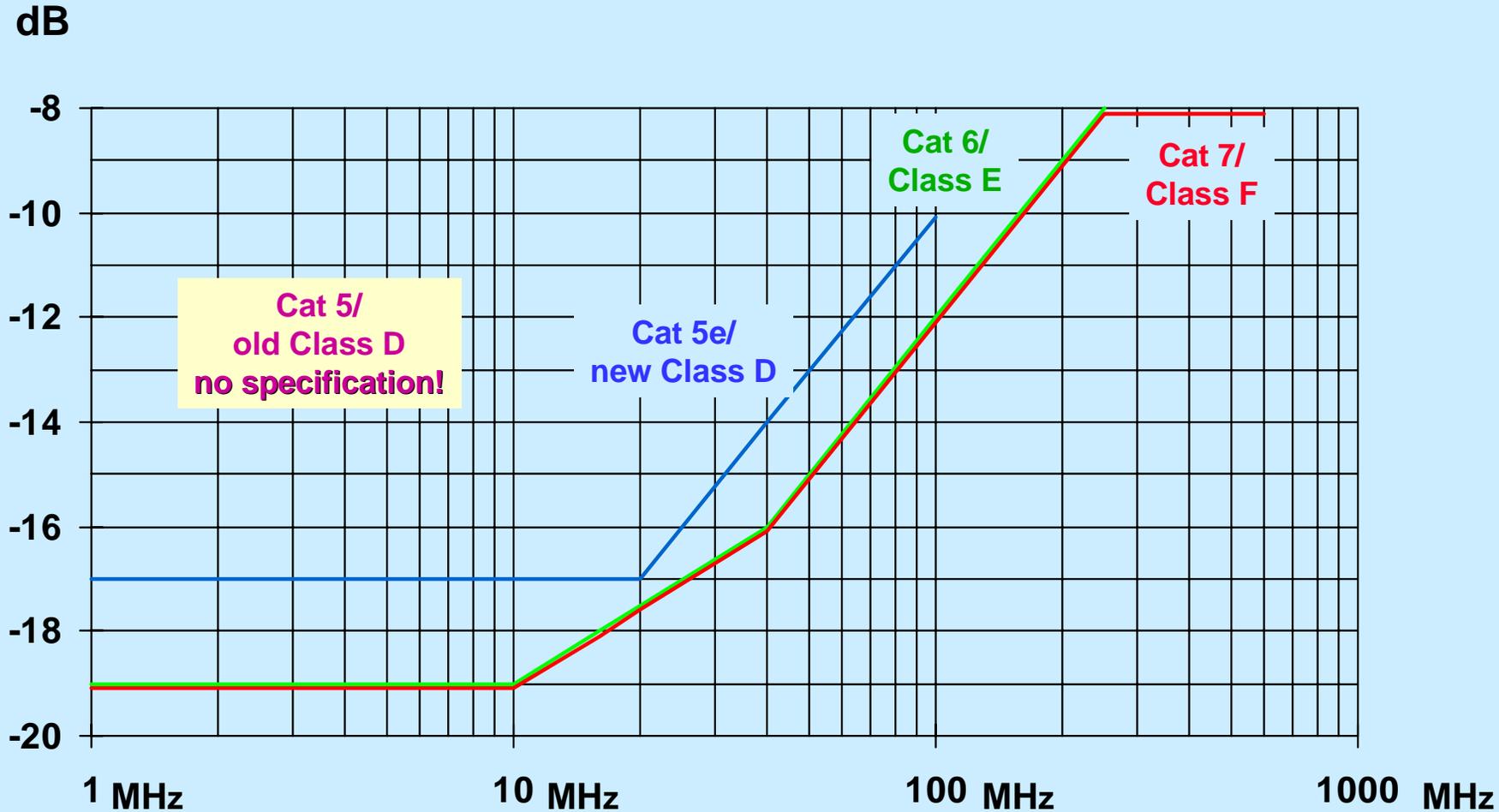
Channel Configuration



Channel Insertion Loss & NEXT



Channel Return Loss



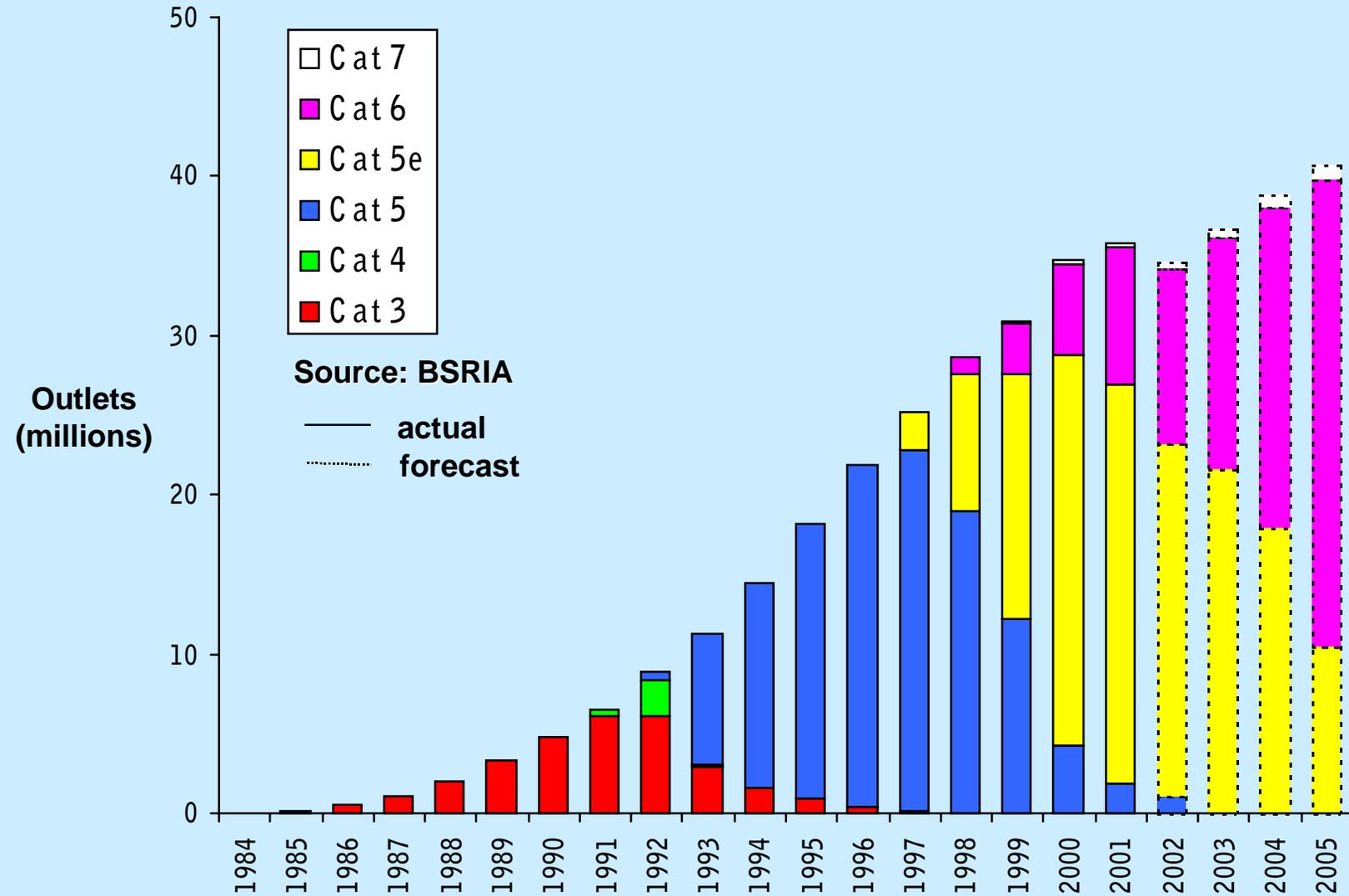
Installation Trends

Segmentation

- **Outlets segmented by Category**
- **Outlets segmented by region:**
 - » *Western Europe* *30% in 2002*
 - » **Eastern Europe**
 - » *North America* *42% in 2002*
 - » **Latin America**
 - » *Asia-Pacific* *22% in 2002*
 - » **Middle East**
- *Regional variations highlighted*

Annual Shipments: BC to 2005

Western Europe

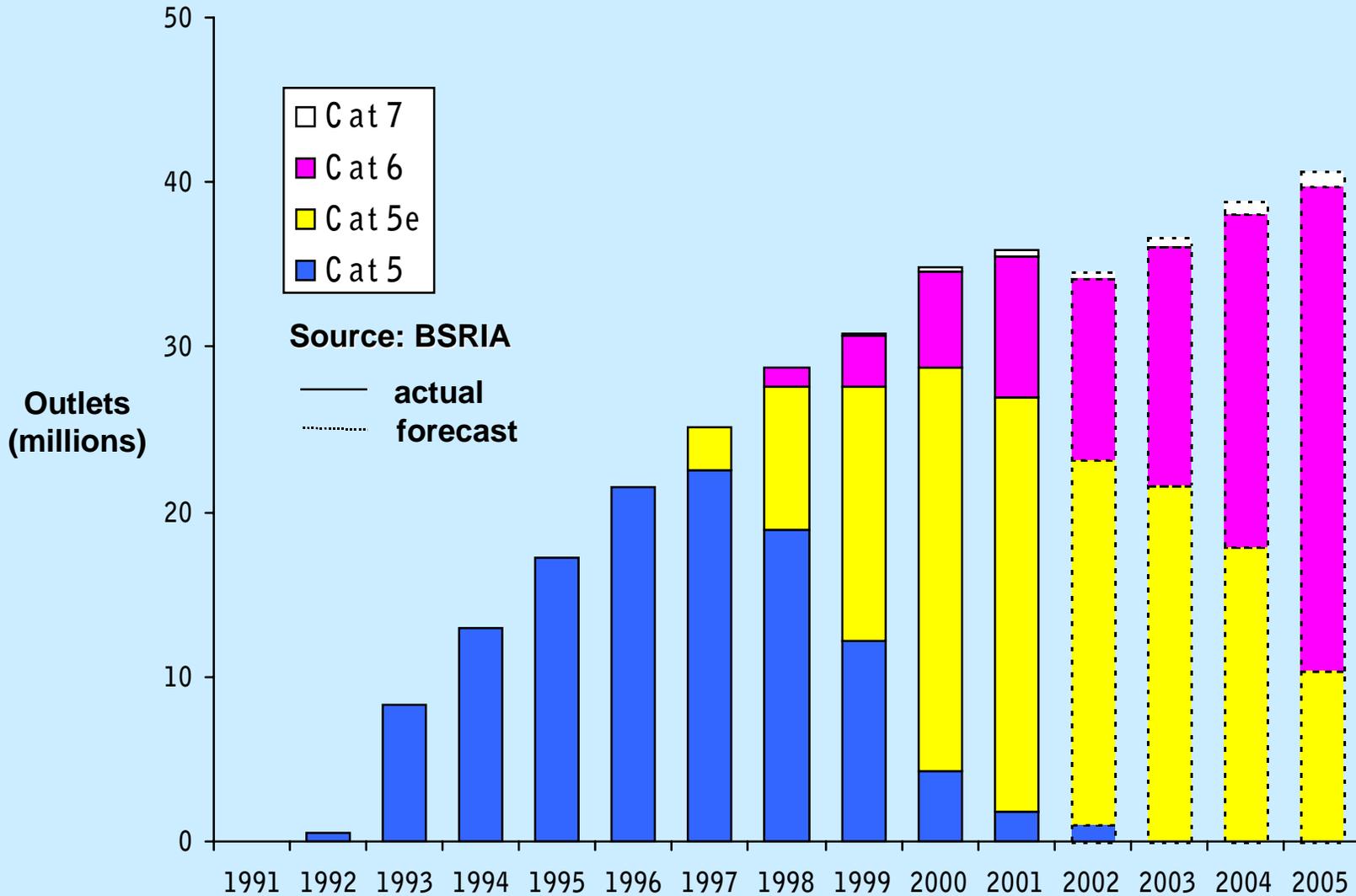


Initial Observations

- **Cat 3, Cat 4, Type 1, coax declined after introduction of Cat 5 cabling**
- **Operating life of structured cabling intended to be at least 15 years**
- **Actual life has been as low as 6 yrs**
- **At least 90% of 1980s cabling is forecast to be replaced by 2005; hence precluded from this analysis**

Annual Shipments: 1991 to 2005

Western Europe

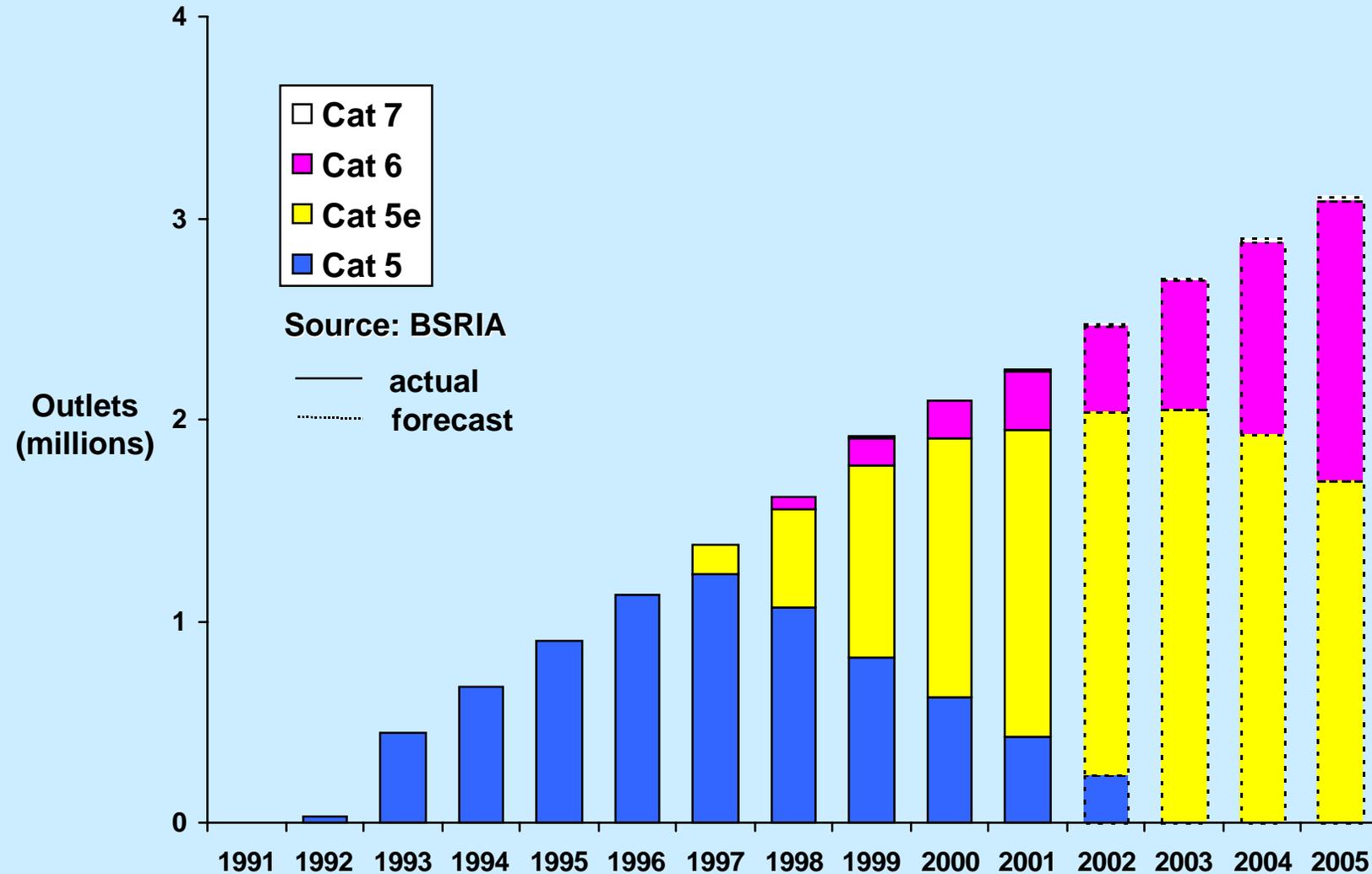


Western European Trends

- **Latest research points to approx 4% deeper recession from 2001 to 2002**
- **Approx 50% horiz'l cables screened**
 - » overall foil-screened cables in France
 - » pair-screened cables in Germ/Aus/Switz
- **85% Cat 7 in Germany/Austria/Switz**
- **Significant levels of Cat 7 cable used for Class E channels (perhaps 50%)**
 - » equivalent to 18 million outlets
- **Fibre outlets 1.5% of total shipments (BSRIA 2002)**

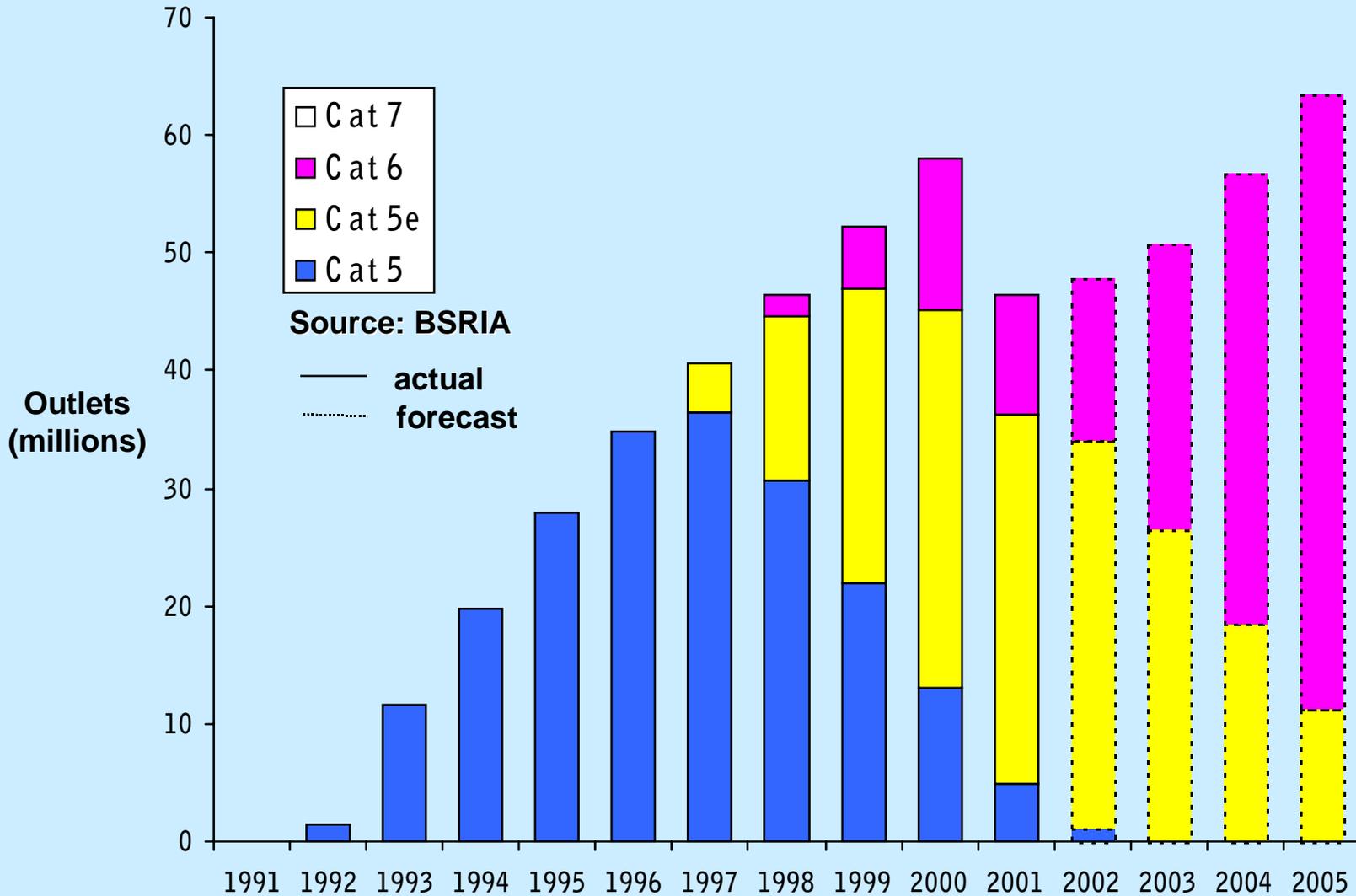
Annual Shipments: 1991 to 2005

Eastern Europe



Annual Shipments: 1991 to 2005

North America

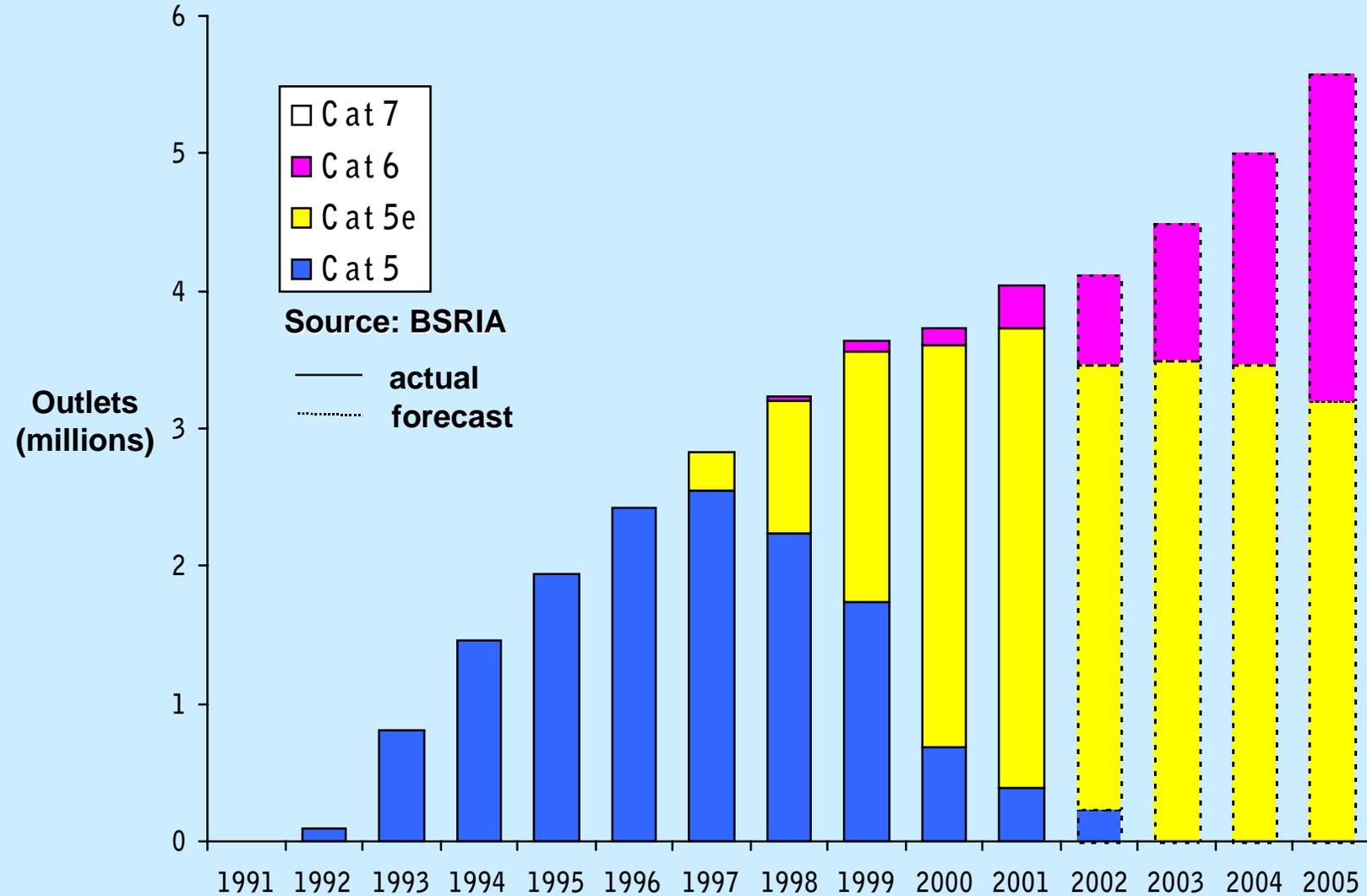


North American Trends

- **Marked recession from 2000 to 2001**
- **99% horizontal cables unscreened**
- **Early & aggressive market for Cat 6**
- **Fibre outlets 1.0% of total shipments (BSRIA 2002)**

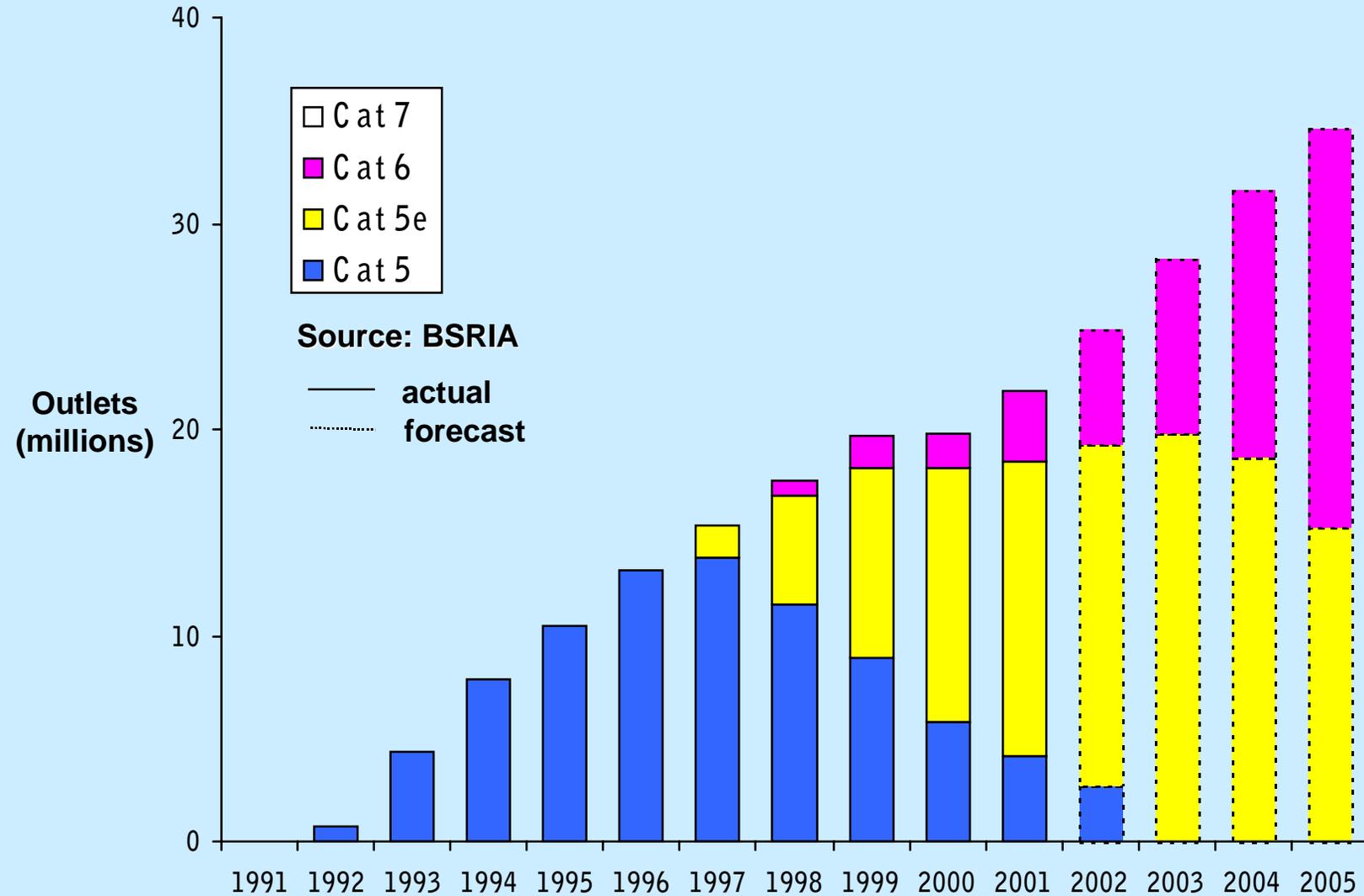
Annual Shipments: 1991 to 2005

Latin America



Annual Shipments: 1991 to 2005

Asia-Pacific

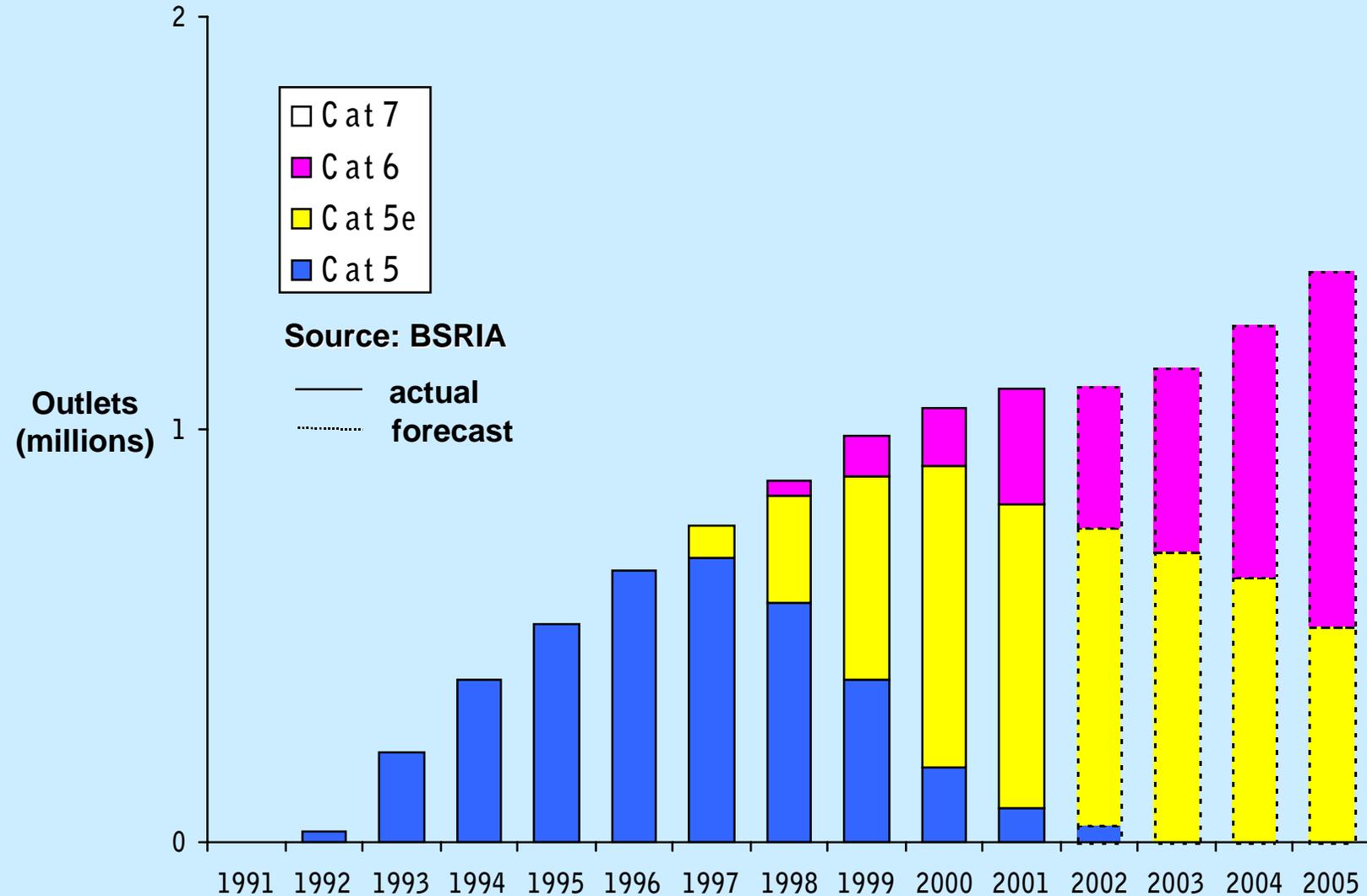


Asia-Pacific Trends

- **Earlier recession from 1999 to 2000**
- **98% horizontal cables unscreened**
- **40% outlets in China, strong growth**
- **Fibre outlets 0.5% of total shipments (BSRIA 2002)**

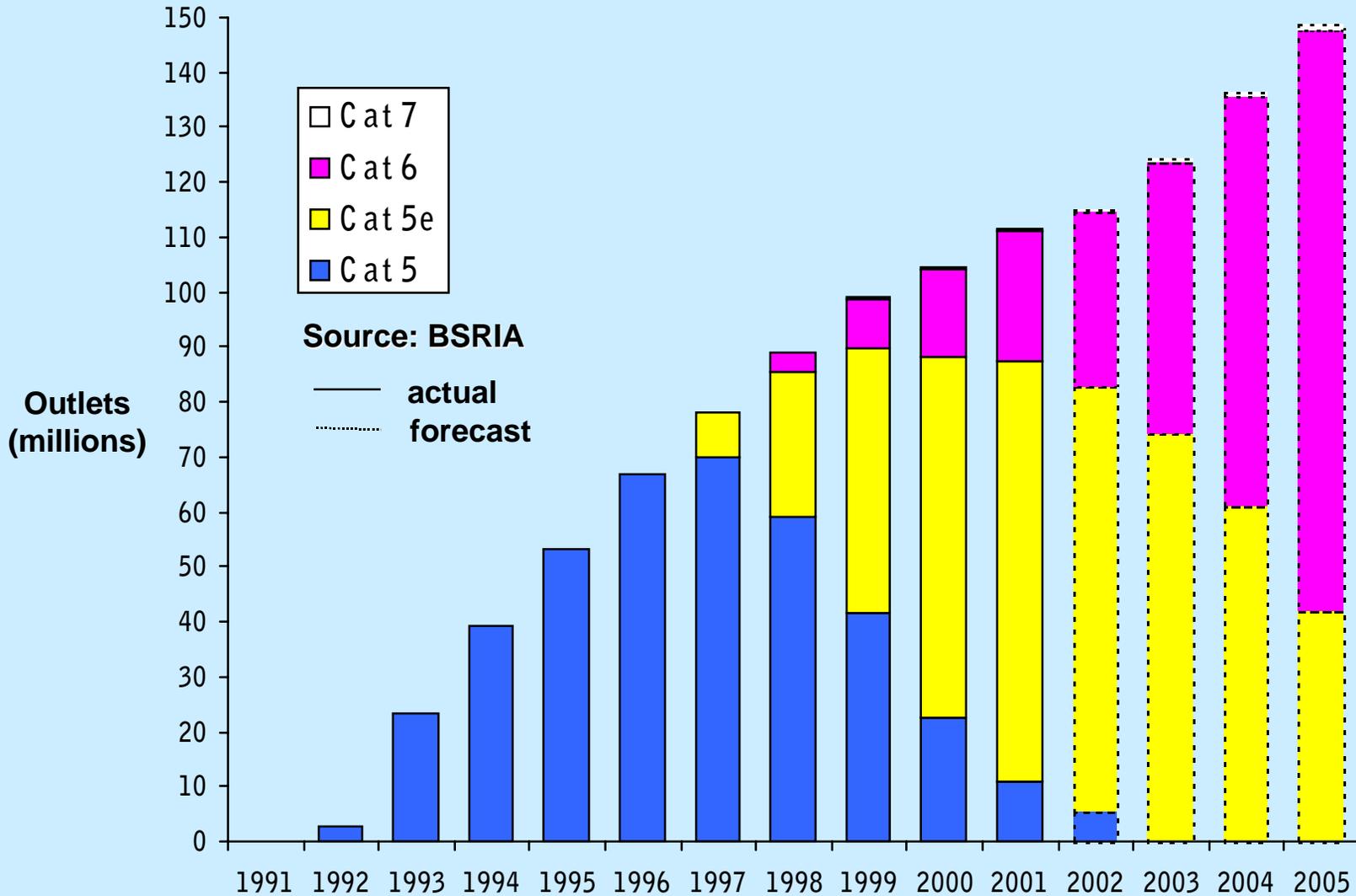
Annual Shipments: 1991 to 2005

Middle East



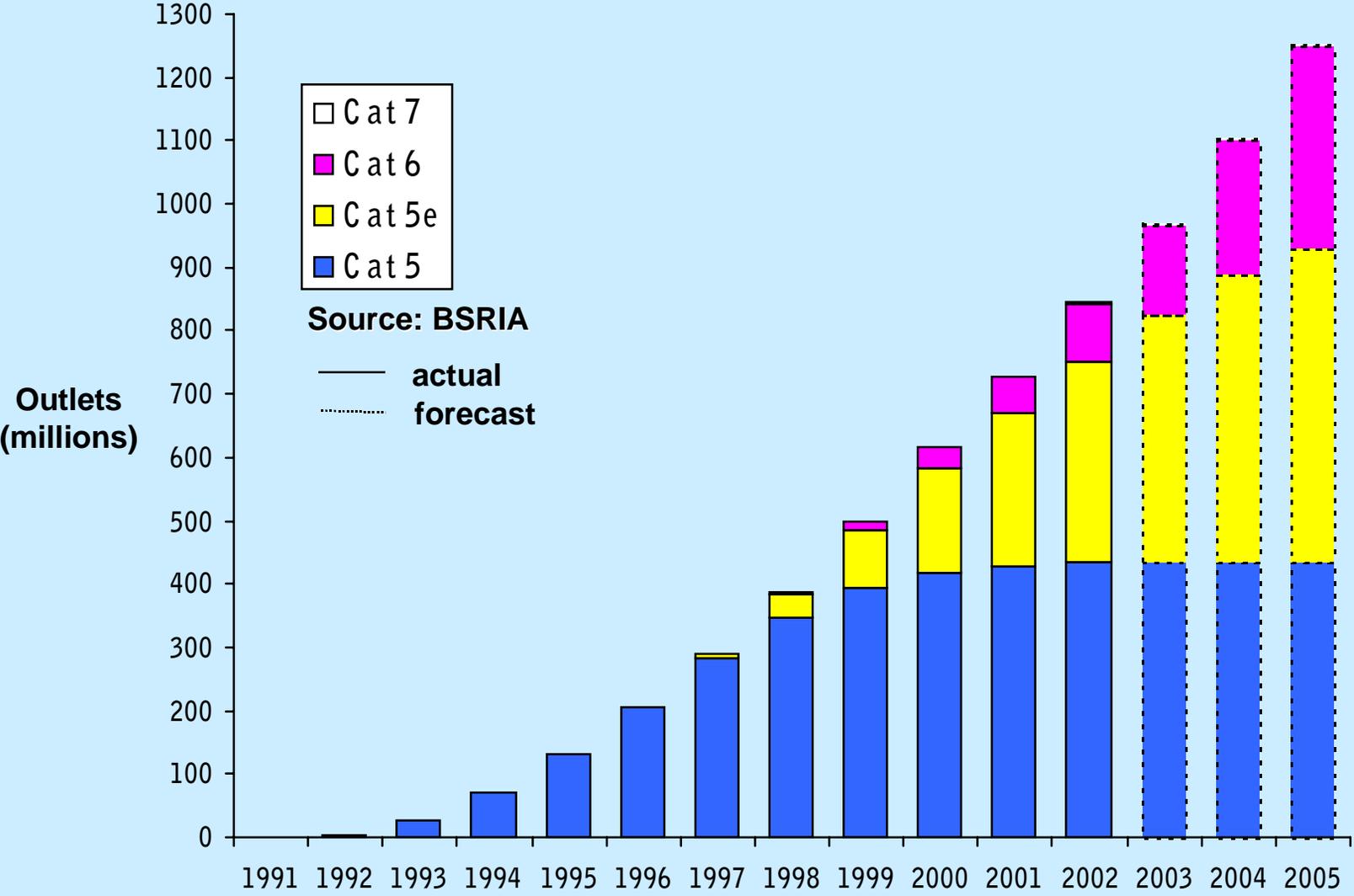
Annual Shipments: 1991 to 2005

World-wide



Installed Base

Cumulative World-wide Shipments



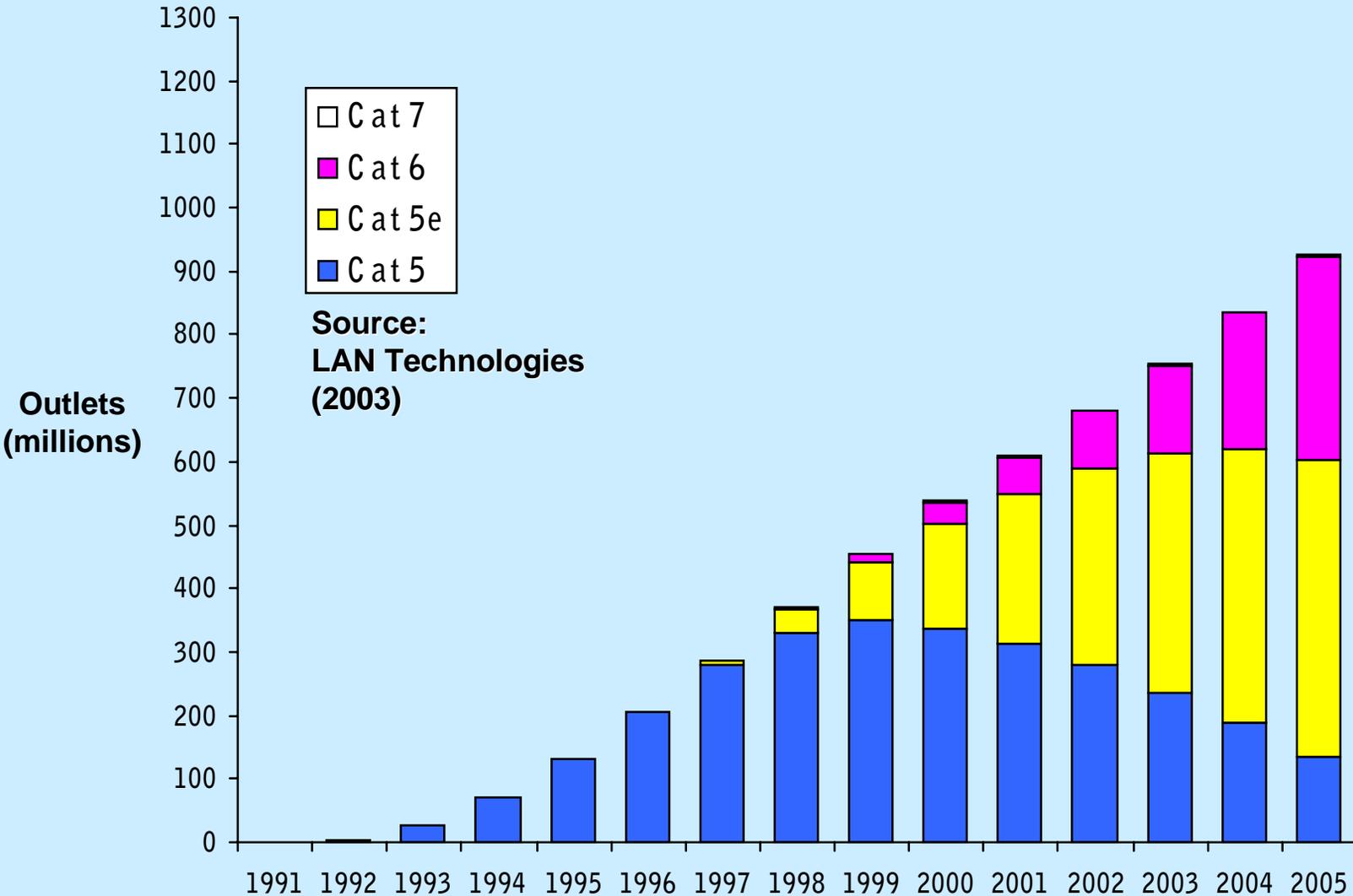
Installed Base Model Assumptions

- **40% new shipments replace existing cabling**
 - » for cabling upgrades & building refurbishment
 - » some regional and industry sector variation
 - » world-wide trend from 1997, in/out of recession
- **new shipments apportioned to Cat 5/Cat 5e:**

	1997	1998	1999	2000	2001	2002	2003	2004	2005
Cat 5	40%	40%	40%	40%	35%	35%	35%	35%	35%
Cat 5e					5%	5%	5%	5%	5%

Estimated World-wide Installed Base

(40% new shipments replaces existing cabling)



Estimated World-wide Installed Base

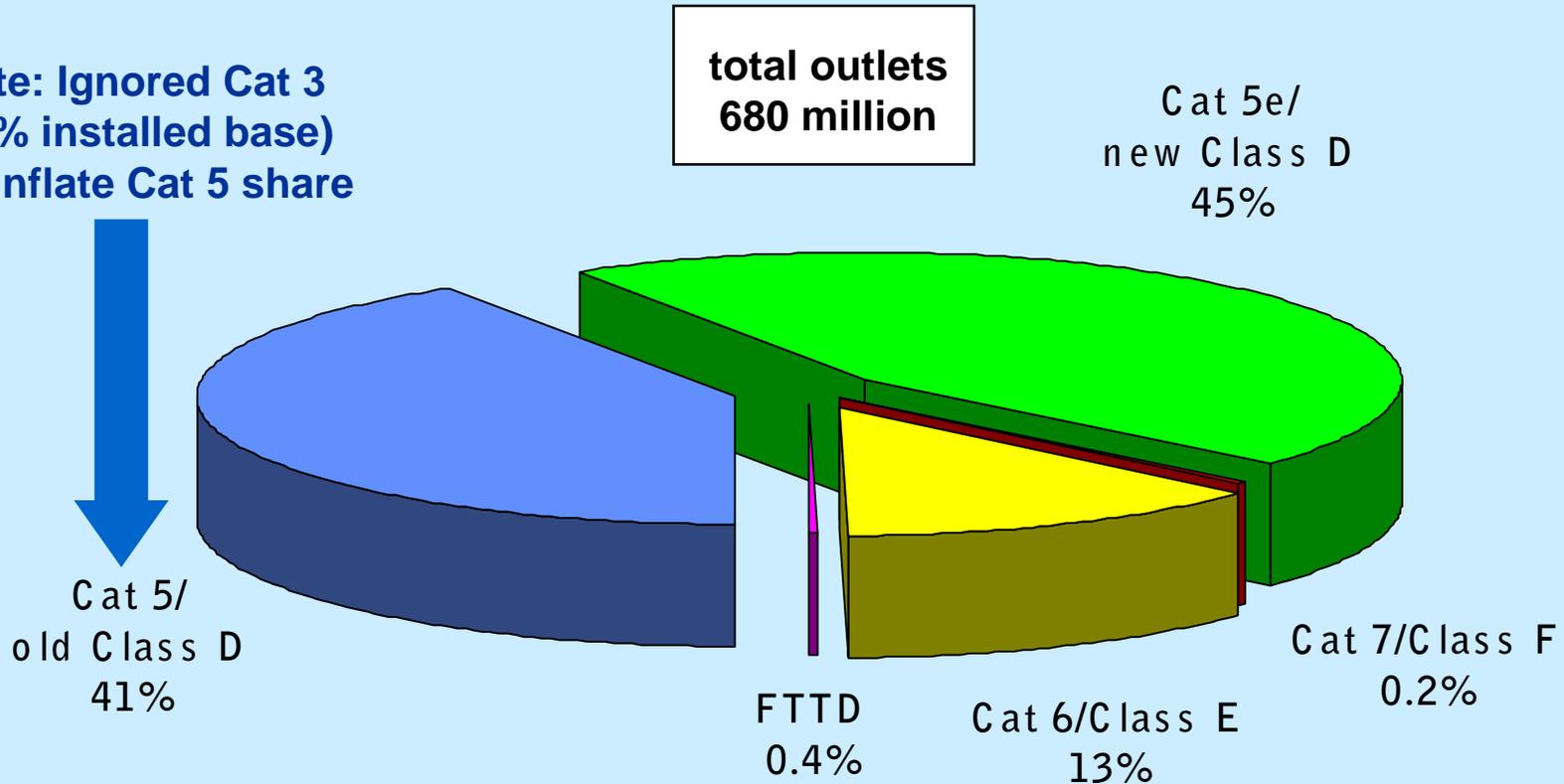
Source: LAN Technologies (2003)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Cat 5	100%	97%	89%	77%	63%	51%	41%	31%	23%	15%
Cat 5e	0%	3%	10%	20%	31%	39%	45%	50%	51%	50%
Cat 6	0%	0%	1%	3%	6%	10%	13%	19%	26%	34%
Cat 7	0%	0%	0%	0%	0.1%	0.1%	0.2%	0.2%	0.3%	0.4%

Summary

Estimated World-wide Installed Base in Dec 2002

Note: Ignored Cat 3
(~7% installed base)
will inflate Cat 5 share



Source: LAN Technologies (2003)

Estimated World-wide Installed Base in Dec 2005

Note: Ignored Cat 3
(~4% installed base)
will inflate Cat 5 share



Cat 5/
old Class D
15%

total outlets
925 million

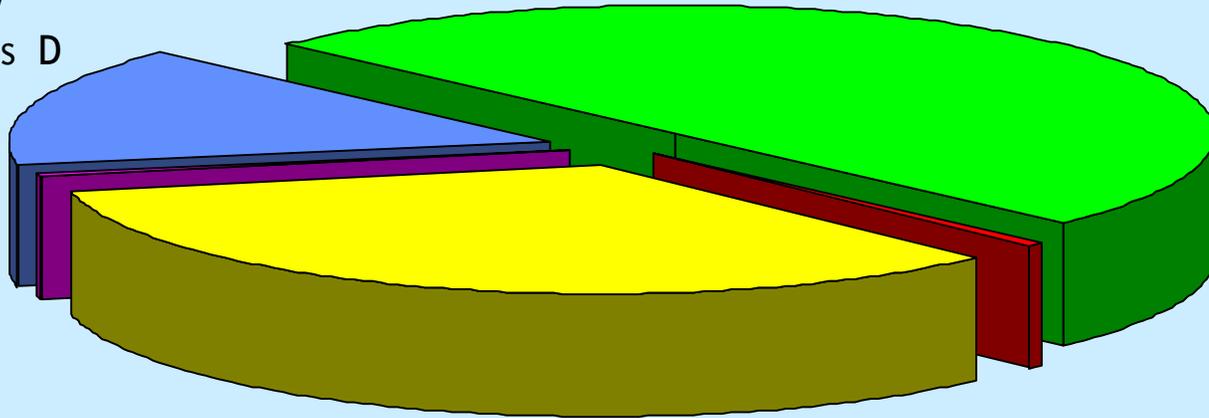
Cat 5e/
new Class D
50%

FTTD
0.6%

Cat 6/Class E
34%

Cat 7/Class F
0.4%

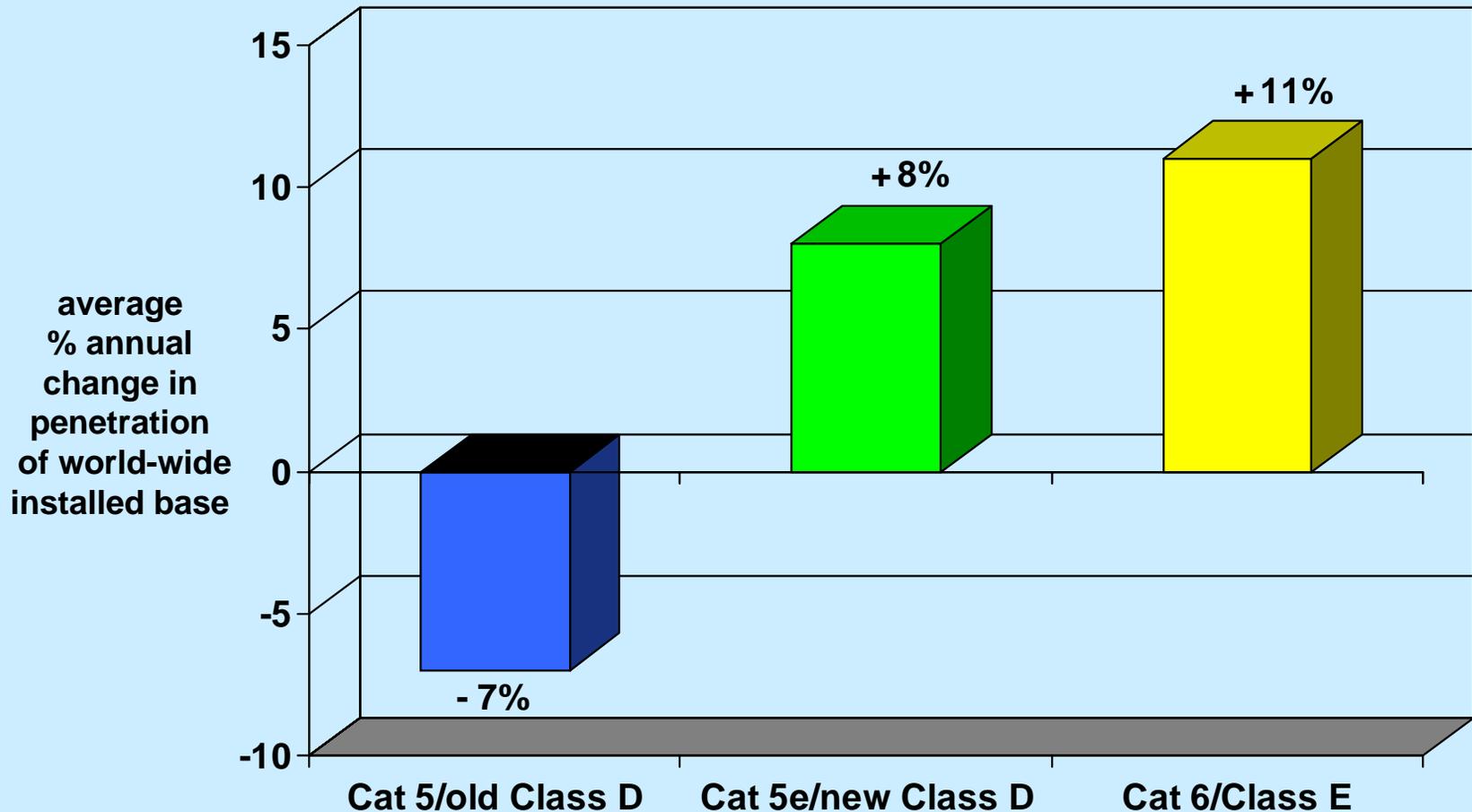
Source: LAN Technologies (2003)



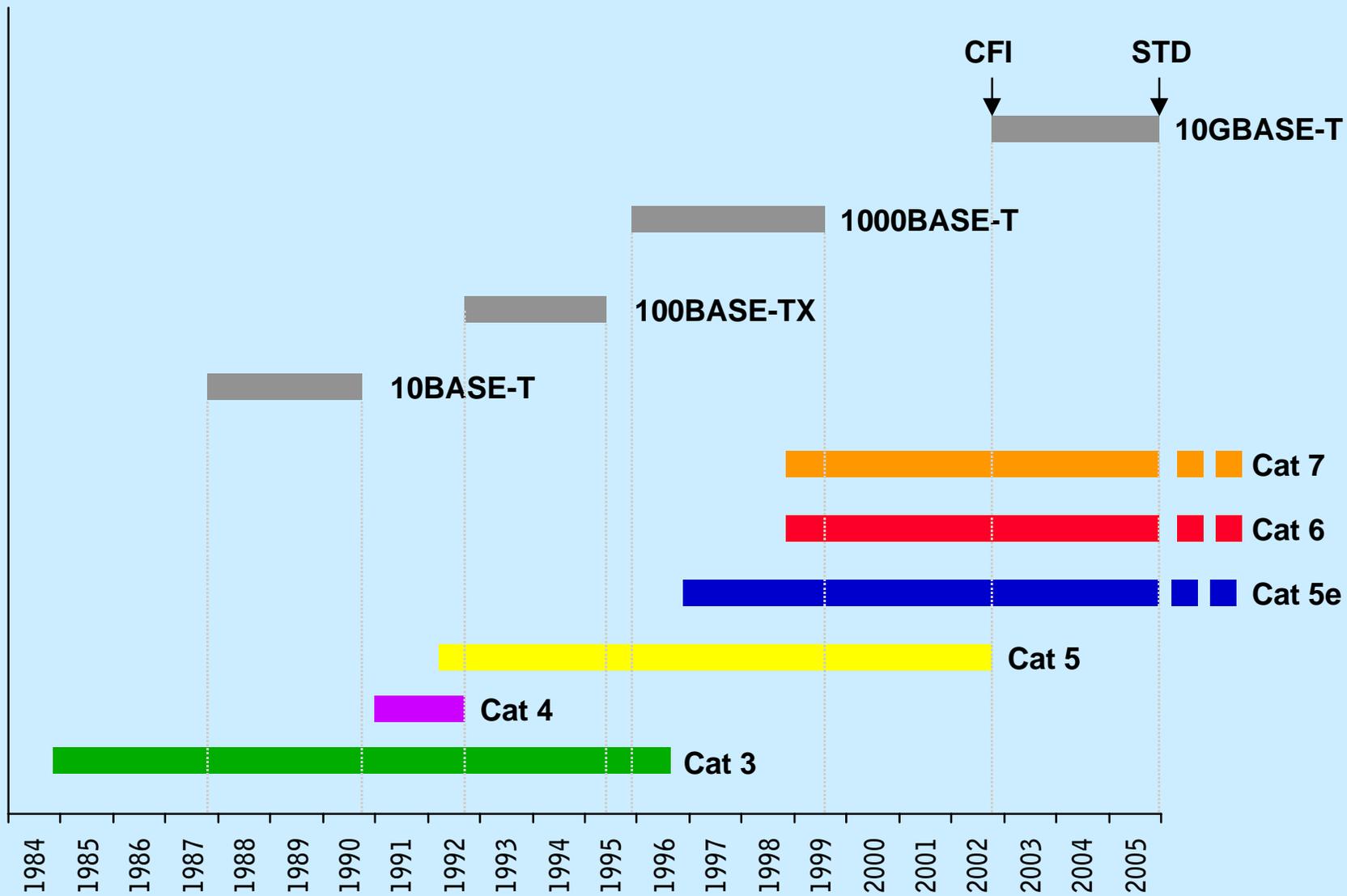
Estimated World-wide Installed Cabling Growth from Jan 2003

(Based on Annual Growth Rates 2002-2005)

Source: LAN Technologies (2003)



Lifecycles



Ethernet Cabling Estimates at Birth

Source: LAN Technologies (2003)

Ethernet Type	IEEE 802.3 Std Approved	Number Installed Outlets		
		Cat 5	Cat 5e	Cat 6
100BASE-TX	June 1995	100m	-	-
1000BASE-T	June 1999	340m	65m	8m
10GBASE-T	Jan 2006??	136m	465m	320m

Questions?