From TDM to NGN

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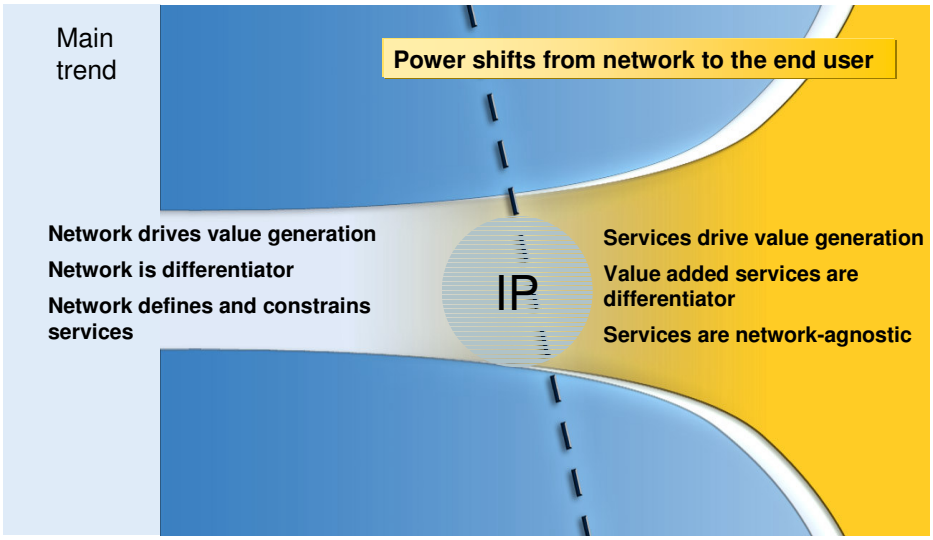
Content

1. Trends
2. Convergence scenarios
3. use cases
4. market figures
5. trials
6. summary

Broadband and IP open the door to IT



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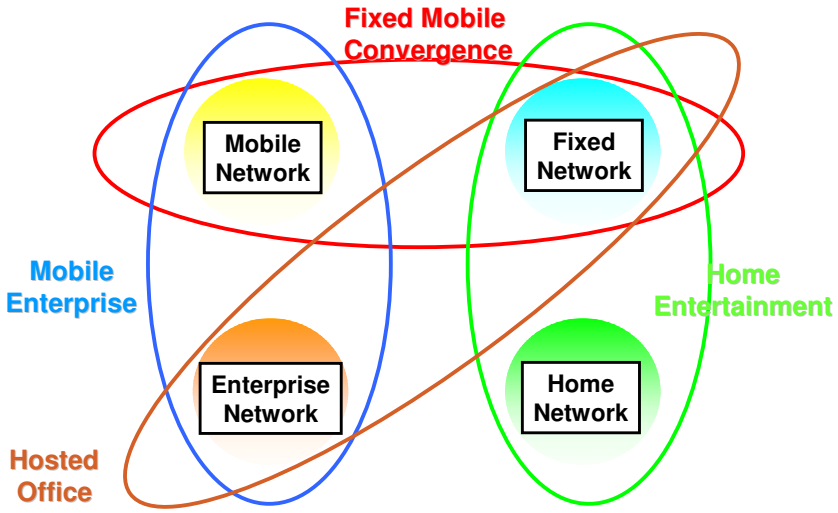
Convergence of: Networks – Services – Application



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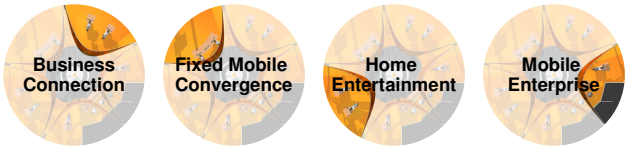
Examples for Converged Network Services



Business Connection	Fixed Mobile Convergence	Home Entertainment	Mobile Enterprise
Hosted Office/ IP Centrex, Office Integration, Call Handling Applications Conferencing	Push-to-Talk, Chat, Instant Messaging, Unified Messaging, Push Services Community Portal	TV Centric Applications –Video Telephony, VoD/AoD*, Internet on TV, Games –, Ring Back Music	Mobile Centrex Mobile Workforce Private mobile numbering office zone solutions

Available on any device
– seamless/unified user experience –
– Single sign-on –

*) VoD = Video on Demand, AoD = Audio on Demand

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Example for Converged Services: TV-based Home Entertainment

- bandwidth of network access is driven by Home Entertainment and Video Communication.

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LifeWork Applications: Business Impact of Push-to-talk

Western Europe

Value Add

- Revenues in Fixed networks generated by IOC (Indoor Outdoor Convergence)
- Dedicated use case will benefit from convergence, Taxi, Cycle Courier, Police, Firefighters, Emergency services, Transportation services, Delivery services (DHL, …)
- Faster service uptake for Mobile due to higher critical mass and use cases that require fixed end station

Penetration (%)

2007:Mobile Consumers: 33%[1]
Mobile Business users: 10%
Fixed Users: Low Case: 0,5%[2]
Fixed Users: High Case: 3%[2]
(Nextel US: Mobile Business 70%)

Revenue per active user

2007: Mobile Consumer: € 4,50 / month
Mobile Business: € 20,00 / month

Major Barriers

- No critical mass of SIP capable fixed phones
- Service might be offered by ASPs/ISPs with portal based service, which provides a lot of challenges for Network Operator to obtain or maintain this new type of business

ARPU Contribution

2007: Mobile Consumer: € 1,50 / month
Mobile Business: € 2,00 / month

[1] ICM User Survey: 06/2003 [2] Own analysis

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LifeWorks Applications: Business Impact of Presence

Western Europe

Penetration (%)

2007: 50% of mobile subscribers[1]
5% of fixed subscribers[2]
26% of internet users[3]

Price

2007: Fixed/Mobile: € 1,50 per month additional charge[1]

Value add

- Service is basis for many other services (IM, Chat, PTT, …) and implies to be offered in Fixed and Mobile network

Usage

2007: For all IMs, Chats, PTTs, Gaming Sessions

Barriers

- Service in Fixed might be introduced by ASPs/ISPs mainly
- No critical mass of SIP capable fixed phones

ARPU Contribution

2007:Mobile € 0,75 / month
Fixed € 0,1 / month

[1]ICM User Survey: 06/2003 [2] All SIP subscribers [3] All Instant Messaging Users

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LifeWorks Applications: Business Impact of Instant Messaging

Western Europe

Value add

- IOC will make it possible for fixed operators/ISPs/ASPs to bill for this service
- Mobile Operators benefit from installed base of Internet IM/Chat users
- Faster service uptake due to higher critical mass – enhanced reachability

Penetration (%)

2007: 30 % of mobile users[1]
26 % of internet users[2]
5% of fixed users[3]

Price

2007: Mobile: € 0,10 (per receiver)
or € 5 flat monthly fee[1/4]
Fixed Corporate: € 2 per user /month[5]

Major Barriers

- Standardization on SIP or Wireless Village?
- No critical mass of SIP capable fixed phones
- Providers such as AT&T provide interworking with AOL/Yahoo based on AOL/Yahoo Messanger installed on mobile phones
- Challenge for Siemens to obtain business in case of portal based solution

ARPU Contribution

2007: Mobile: € 1,50 / month
Fixed: € 0,25 / month

[1]ICM User Survey: 06/2003
[2]Raymond James & Associates, Inc.
[3]Deutsche Telekom
[4]AT&T Wireless & Yahoo & AOL
[5]MSN

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The Message remains: No market growth without Applications, IP and Ethernet as well as Services

Wireline Carrier Market Highlights and Trends

- The Wireline Carrier Market reached **52.4 bil € in 2003**. The **overall market growth (CAGR 03-09) is estimated at 7.6%. Asia/Pacific with most attractive growth rates (9.0%) among the top regions** (Western Europe 7.8%, North America 5.9%).
- The combination of secure wireless home/office networking with entertainment applications such as online gaming, networked Private Video Recording and digital audio is fertilizing the whole **CPE** industry.
- Most carriers making steady progress toward sustained profitability, but they continue to spend CAPEX conservatively to ease their debt burdens and improving cash flow. Instead of building new, most incumbents are **optimizing existing infrastructures.**
- **WLAN and WiMAX** are opportunities for wireline carriers to provide wireless and even mobility services
- **Blurring of Communication, IT and Entertainment** around the Internet does change the role of carriers
- **Delayering** of Handware and Software; Modularization of HW and Software components
- A **new Security model** is a key issue for Next Generation Networks
- Asia Pacific is dominating the **Local Loop** Market in mostly all subsegments. While the DSLAM market is flat, new access alternatives such as **PON, WLAN and WiMax are growth drivers**.
- Vendors add **additional functions to NG SONET/SDH** such as WDM support, distributed cross-connect, and data aggregation and switching, enabling carriers to reduce the number of equipment in the metro network
- Service providers see the **need for packet-based services as a key driver** to deploy next generation voice equipment
- The **growth in Converged Network investment will not compensate the decline in traditional CO Switching**.
- **Data Network Convergence** and adoption of MPLS are driving factors in future network deployments
- As Carriers were not able to reduce OPEX significantly over the last few years (compared to their successful CAPEX-reduction), **the Service Market continues to open up for external service suppliers**.

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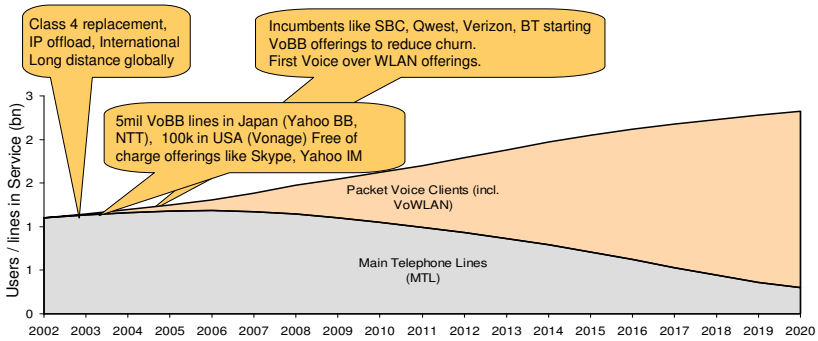
Tomorrow's Voice Service will be different from Yesterday's Voice Service



Characteristics	*Main Line*	*Packet Voice Client*
Technology:	*TDM, proprietary*	*IP, standardized*
Topology:	*centralized*	*De-centralized*
Tarif structure:	*time and distance*	*flat rate, part of defined service bundle*
Quality:	*Hard QoS, lifeline*	*Soft QoS, „lifeline" through multiple access alternatives*
Subscriber associated with:	*physical fixed line*	*one personal number, network/access agnostic*
Services:	*voice centric*	*data centric, voice is only one application*
Service Provision:	*Telco*	*Telco, ISP, MSO, etc.*

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Digitalization, Miniaturization, Internet and Broadband Access are underlying trends

Wireline Carrier Market Highlights and Trends

Business Trends
- Revenue growth
- Competitive advantage
- Real-time enterprise
- Virtualization
- Globalization
- Business continuity
- Productivity
- Cost reduction

IT Trends
- The new systems architecture
- Web-based applications
- Business process fusion
- CRM, supply chain management or enterprise resource planning
- Web services
- Grid computing
- Disaster recovery

Telecom Trends
- Convergence
- Internet Protocol
- Broadband
- Wireless
- Mobility
- Video
- Net intelligence vs. Peer to Peer
- Net applications
- Decentralization
- Outsourcing of Services
- Distinction blurring with computing

Consumer Trends
- Convergence Entertainment with Computing
- Networked and Connected Home
- Broadband to the Home
- Wireless/Power-line Home Netw.
- Personal Area Network
- Ad-hoc Network
- Video on-demand
- Smart Home
- Vehicular network

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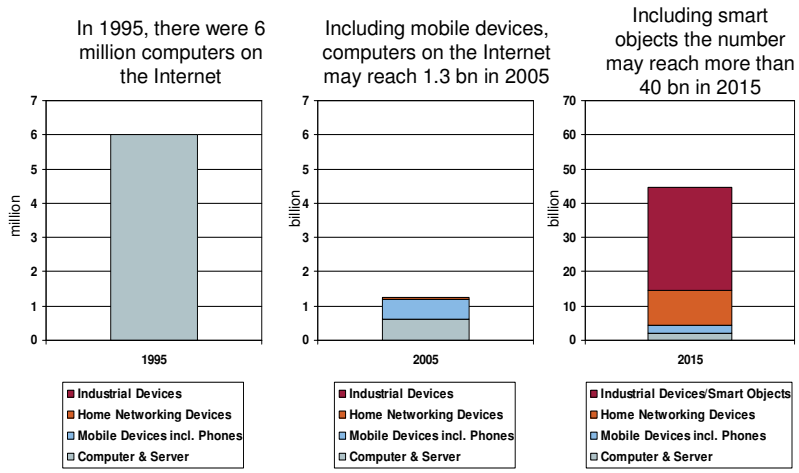
In 2015, more than 40 bn devices/Smart objects will be connected. This „connectivity“ trend is driving Routing & Switching and Applications

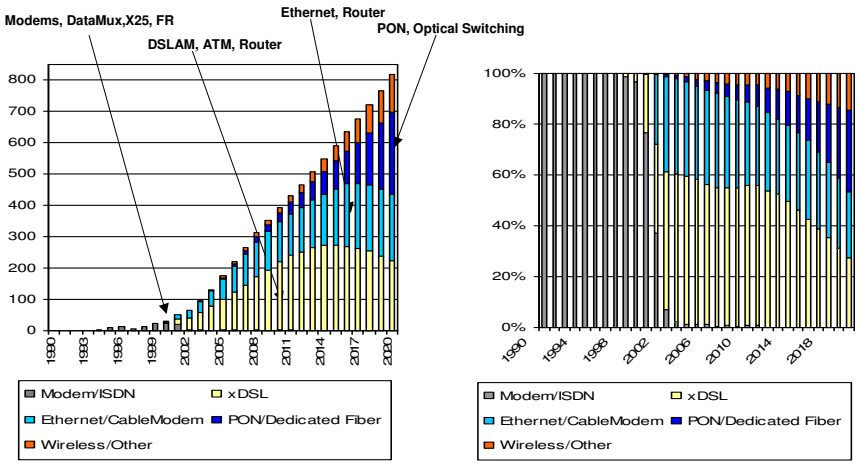
Number of Computers connected to the Internet (in million)



Source: DellOro, ICM, IDC, ICN GS SD

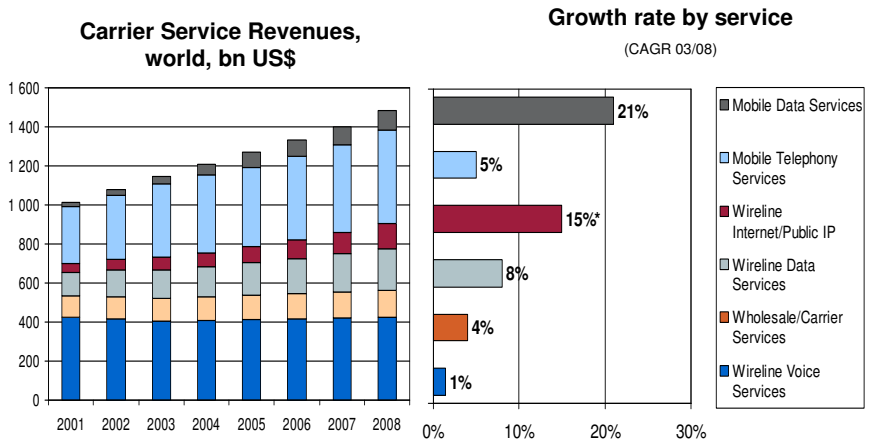
Broadband Access is Key for Application Revenue

Access Technology Change [million broadband lines in service]



Worldwide telecommunication services revenues grow at 5.5% p.a. The growth is in Wireline/Mobile Internet/Data Services.

Carrier Service Revenues



Source: Gartner June, December/2003, ICM for mobile data trend; *Wireline Internet Service Revenue w/o Games, Video, Audio

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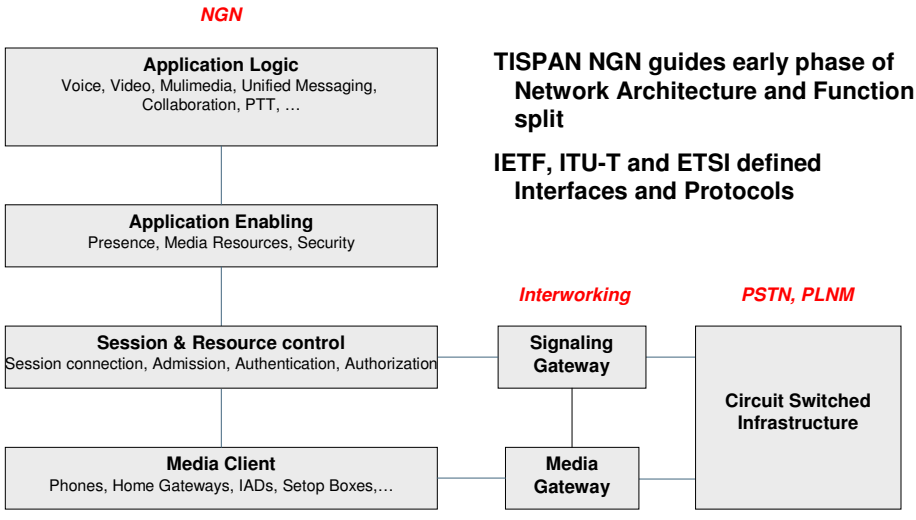
Applications use Network Architecture and Building Blocks According to TISPAN and ITU NGN



TISPAN NGN guides early phase of Network Architecture and Function split

IETF, ITU-T and ETSI defined Interfaces and Protocols

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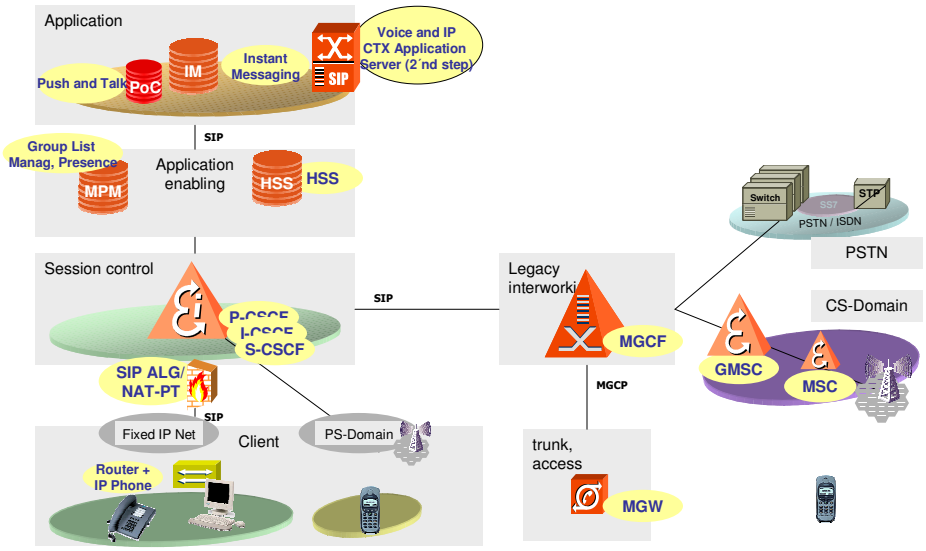
FMC trial implementation up and running



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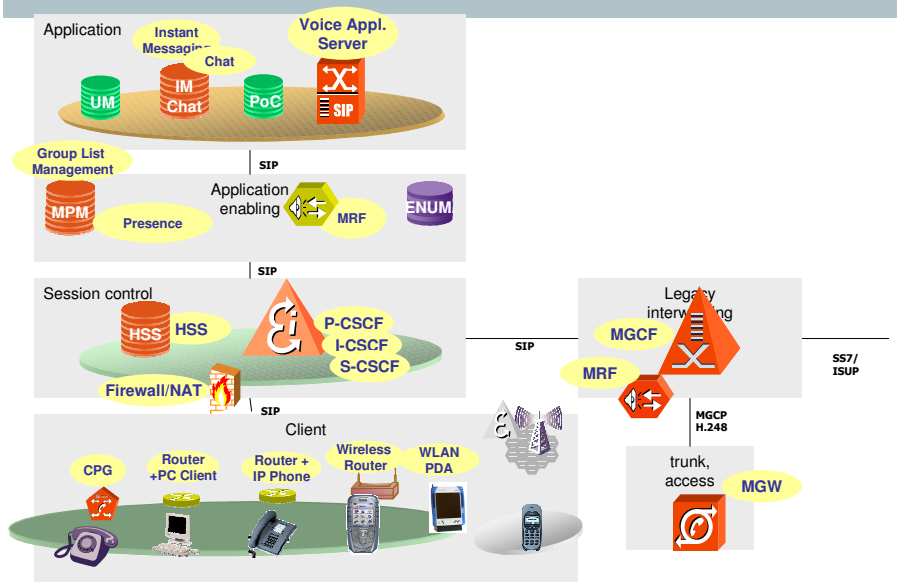
extended FMC trial



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Conclusions

The market is ready

- for cost savings
- for new applications
- for various kinds of convergence

Technology

- very mature for softswitches, gateways
- IMS successfully introduced
- provides for real value add

Let go !

List of Abbreviations 1/4

List of Abbreviations

IP	Internet Protocol
SMS	Short Message Service
MMS	Multimedia Messaging Service
TV	Television
IOC	Indoor Outdoor Convergence
ARPU	Average Revenue per User
ASP	Application Service Provider
ISP	Internet Service Provider
IM	Instant Messaging
PTT	Push to talk
SIP	Session Initiation Protocol
WLAN	Wireless Local Area Network
WiMAX	Worldwide Interoperability for Microwave Access
CPE	Customer Premises Equipment
HW	Hardware

List of Abbreviations 2/4

PON	Passive Optical Network
DSLAM	Digital Subscriber Line Access Module
SONET	Synchronous Optical Network
SDH	Synchronous Digital Hierarchy
WDM	Wavelength Division Multiplexing
CAGR	Cumulated Annual Growth
IT	Information Technology
CO	Central Office
MPLS	Multi Protocol Label Switching
OPEX	Operational Expenditures
CAPEX	Capital Expenditures
TDM	Time Division Multiplexing
MSO	Multi Service Operator
QoS	Quality of Service
TISPAN	Telecoms & Internet Converged Services & Protocols for Advanced Networks
IETF	Internet Engineering Taskforce

List of Abbreviations 3/4

ITU-T	International Telecommunications Unions Telecommunications Sector
ETSI	European Telecommunication Standardization Institute
IAD	Integrated Access Device
NGN	Next Generation Networks
MPM	Mobile Presence Manager
PoC	Push to talk over Cellular
PS	Packet Switching
MGCF	Media Gateway Control Function
MGW	Media Gateway
GMSC	Gateway Mobile Switching Centre
MSC	Mobile Switching Centre
PSTN	Public Switched Telephone Network
CSCF (P, I, S)	Call State Control Function (Proxy-, Interrogating-, Serving-)
ALG	Application Layer Gateway
NAT-PT	Network Address Translation - Protocol Translator

List of Abbreviations 4/4

MRF	Media Resource Function
HSS	Home Subscriber Service
ENUM	E.164 Number Mapping
SS7	Signaling System #7
ISUP	ISDN User Part
IMS	IP based Multimedia Sub-System

See also:
networks.**siemens**.com/**communications**/
lexicon/fached/fach_f.htm