KMD – National Data Storage

in the PIONIER network

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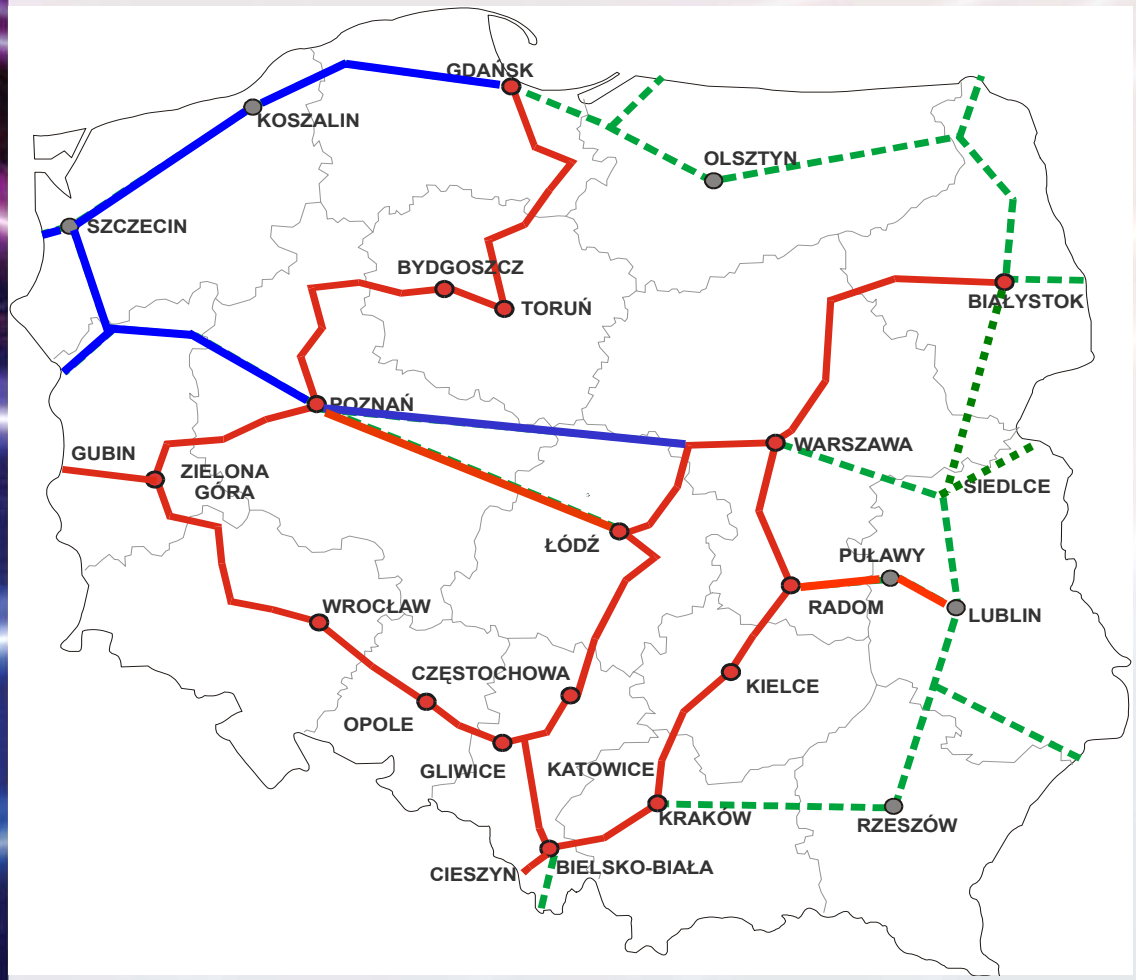
Location


EUROPE
EUROPEAN UNION
EU Member States
EU New Members 2004
EU Candidates
EFTA Member States
© Nations Online Project
Greenland Sea
Reykjavik
ICELAND
Norwegian Sea
Faroe Islands (DENMARK)
Atlantic Ocean
North Sea
Celtic Sea
English Channel
Bay of Biscay
Mediterranean Sea
Tyrrhenian Sea
Adriatic Sea
Ionian Sea
Aegean Sea
Baltic Sea
Black Sea
Gulf of Bothnia
Hammerfest
Murmansk
Kiruna
Oulu
SVERIGE SWEDEN
SUOMI FINLAND
NORGE NORWAY
Trondheim
Sundsvall
Tampere
Helsinki
St. Petersburg
Bergen
Oslo
Gavle
Stockholm
Tallinn
ESTONIA
RUSSIA
Moscow
Riga
LATVIA
Aberdeen
Edinburgh
Belfast
Goteborg
DANMARK DENMARK
Copenhagen
ÉIRE IRELAND
Dublin
Newcastle
Liverpool
LITHUANIA
Vilnius
Minsk
Gdansk
Rostock
UNITED KINGDOM
Cardiff
London
NETHERLANDS
Amsterdam
Hamburg
Hannover
Berlin
Poznan
Warsaw
BELARUS
DEUTSCHLAND GERMANY
Leipzig
BELGIUM
Bruxelles
Cologne
Le Havre
LUXEMBOURG
Frankfurt
Prague
CZECH REPUBLIC
Krakow
Lviv
Kiev
UKRAINE
Paris
Strasbourg
Nantes
SLOVAKIA
Bratislava
Vienna
Munich
Österreich Austria
Budapest
HUNGARY
FRANCE
Bern Switzerland
Geneva
Lyon
Bordeaux
Pecs
Cluj-Napoca
ROMANIA
MOLDOVA
Chisinau
Odessa
Ljubljana SLOVENIA
Zagreb CROATIA
Milan
Venice
BOSNIA AND HERZEGOWINA
Belgrade
Bucharest
Constanta
Varna
Bilbao
Porto
Marseille
ANDORRA
Florence
Sarajevo
SERBIA AND MONTENEGRO
BULGARIA
Sofia
ITALIA ITALY
Rome
Podgorica
Skopje MACEDONIA
Istanbul
ASIA
PORTUGAL
Lisbon
Madrid
Barcelona
ESPAÑIA SPAIN
Valencia
Naples
Tirana
ALBANIA
Thessaloniki
TURKEY
Sevilla
Malaga
Cagliari
Ελλας GREECE
Patrai
Athens
Palermo
CYPRUS
AFRICA
Valletta
MALTA
CRETE
250 Km
250 Mi.

PIONIER - Available infrastructure



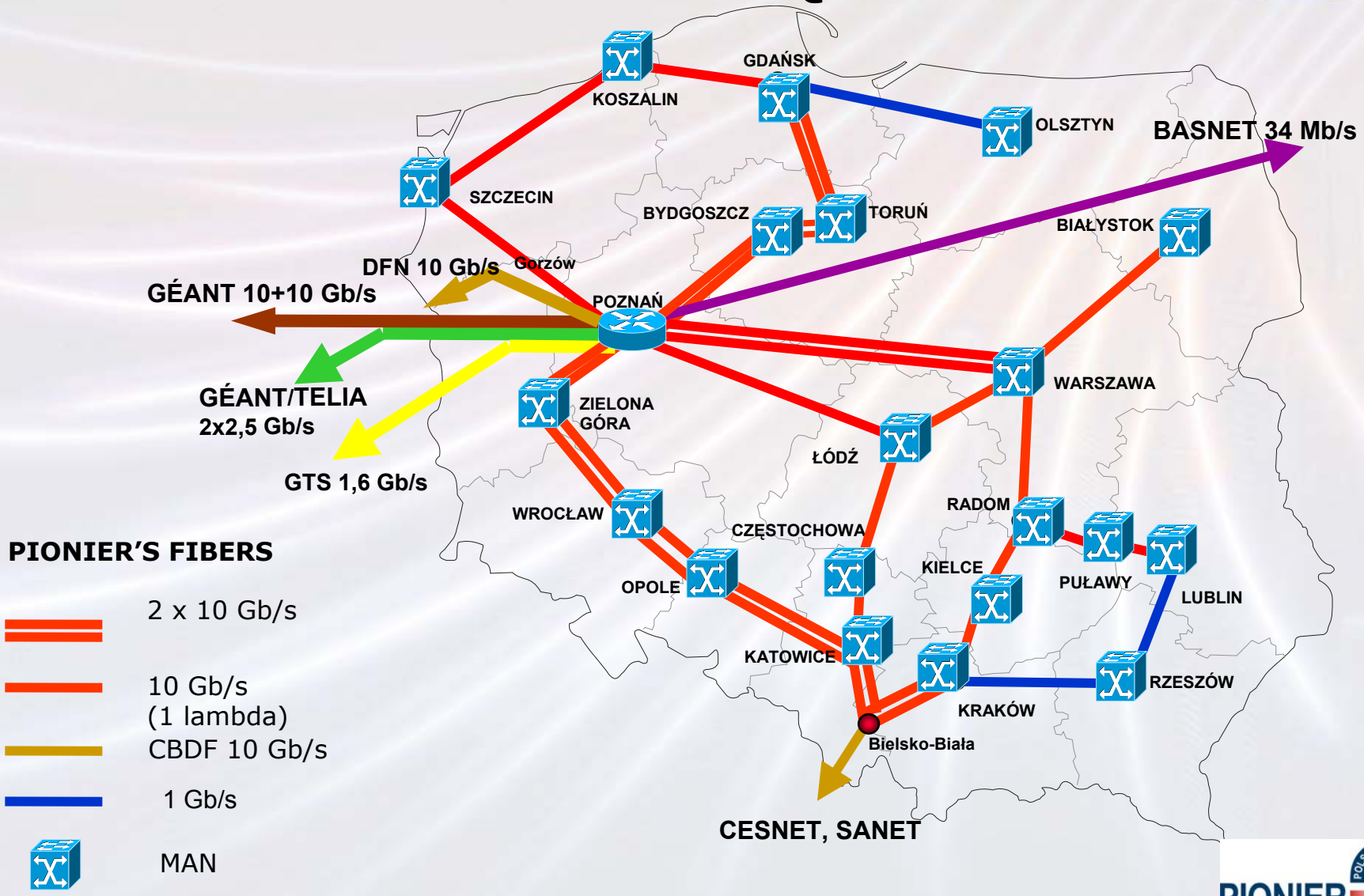
Installed fibers

PIONIER nodes

Fibers+pipes (end of 2005)

Fibers+pipes (end of 2006)

PIONIER – transmission 4Q2005

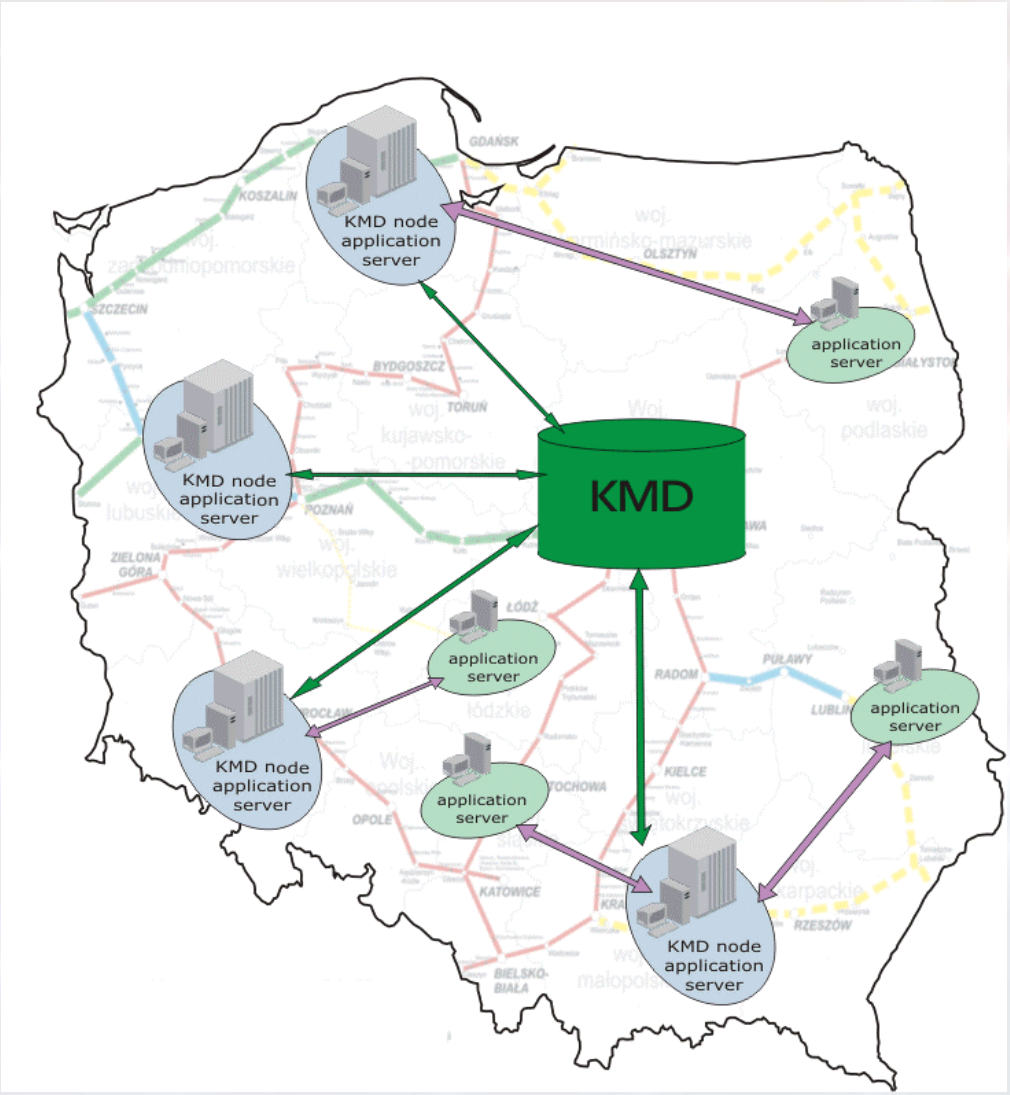


Project Partners

- ✓ Academic Computing Center CYFRONET AGH, Kraków
- ✓ Academic Computing Center in Gdańsk (TASK)
- ✓ Częstochowa University of Technology
- ✓ Marie Curie-Skłodowska University in Lublin
- ✓ Poznań Supercomputing and Networking Center (PNSC)
- ✓ Technical University of Białystok
- ✓ Technical University of Łódź
- ✓ Wrocław Supercomputing and Networking Center (WCSS)

National Data Storage - goals

- **Reliable and distributed** data storage systems
  - national level
- The system includes: hardware infrastructure and Backup/Archive **management system** (server and client)
- The hardware infrastructure: **hierarchical storage** systems, file servers, application servers
- Network: uses **PIONIER** communication channels and the infrastructure of city



The target infrastructure:

4 KMD nodes (thick)

4 application nodes

Embedded in PIONIER

Features:

High security level

✓Confidentiality and integrity of data (advanced B/A client)

Higher reliability

✓System and data availability

✓Fault tolerance (hardware and software)

Wide service access

✓National (PIONIER+city net)

✓Many SAPs

Efficiency

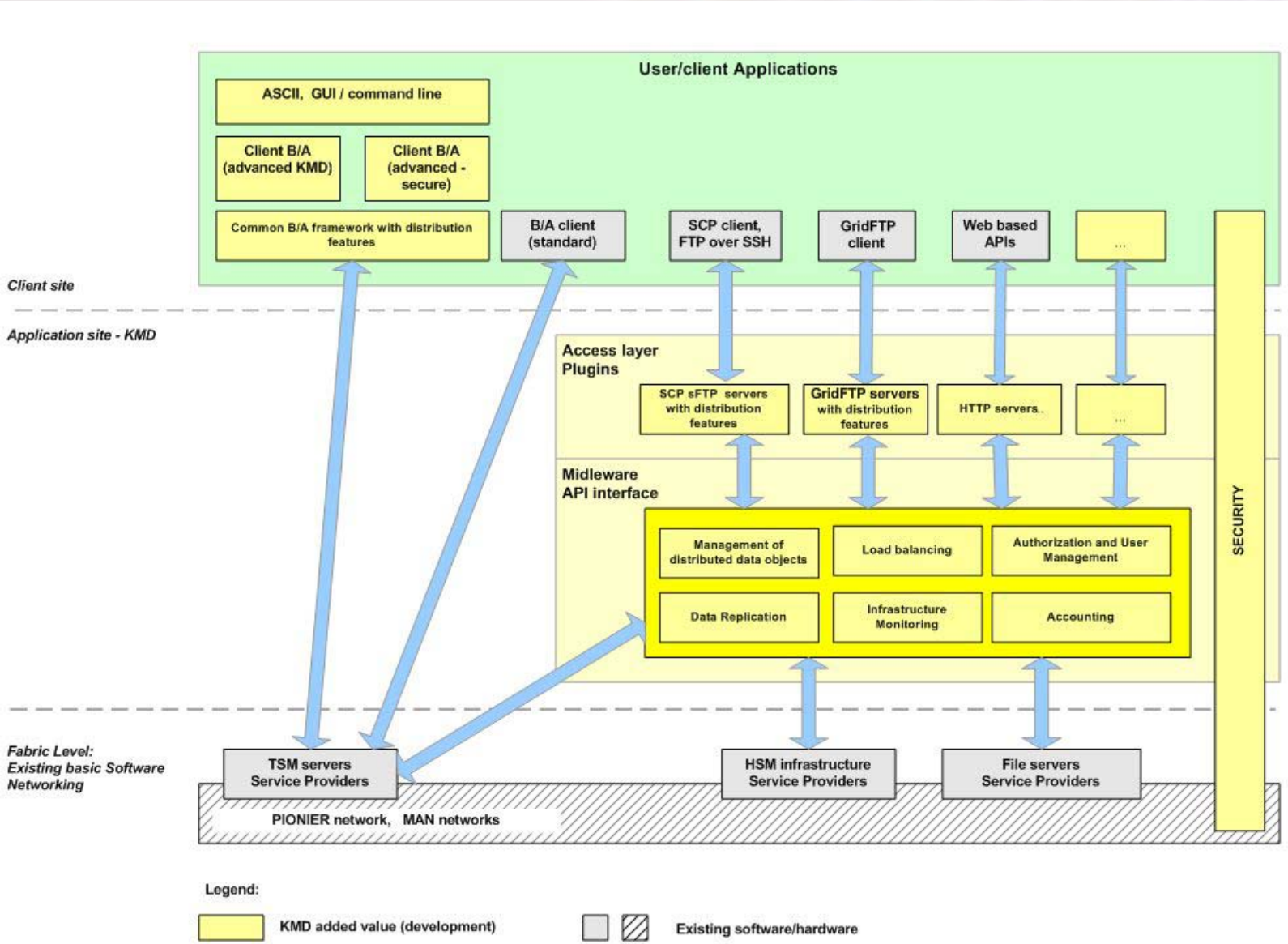
✓Fast backbone networks, broadband network access

✓High-end systems (tape libr.,RAIDs)

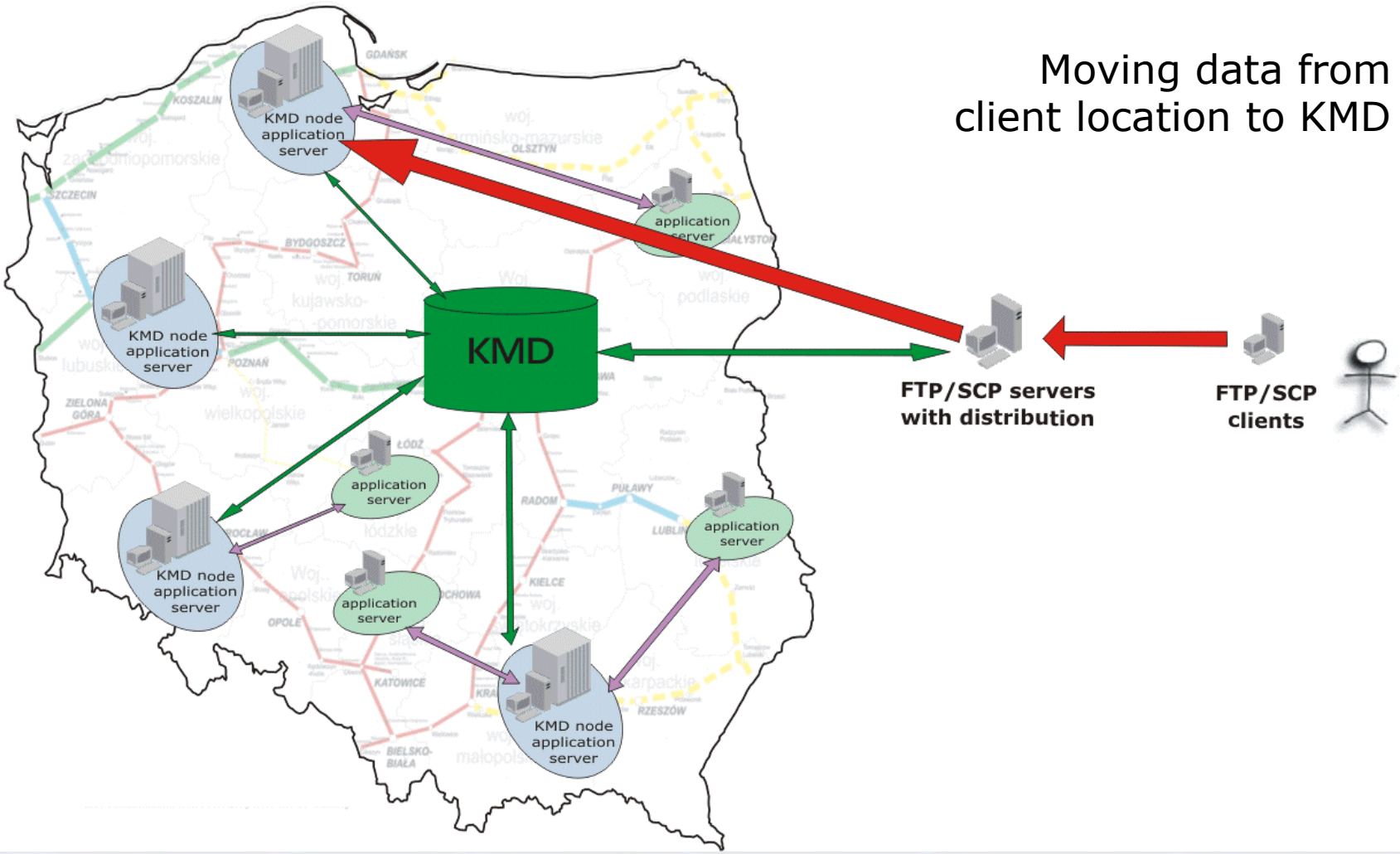
Added Value

- **Flexible policy definition**
- **High level of security and reliability**
  - ✓ **Geographical replications** – many localisations
  - ✓ **Coherency of distribued data –** KMD management software
  - ✓ **Data coding –** used in some scenarios (for advanced client configurations)
  - ✓ **High accessibility – thanks** to appropriate hardware redundancy and the fault tolerance features in KMD management software
- **User interface integrated with the new system features**
  - ✓ Data encryption, data coherency
    - ✓ Encryption – software and/or hardware based (cert. equipments)
      - ✓ before moving the data from the customer into KMD
    - ✓ Ensuring data coherency – by MD5, HMAC
  - ✓ High availability – ensured by the management software
    - ✓ The target data location can be chosen
    - ✓ The data replica location can be chosen
- **Confidentiality of the archived data**
  - ✓ The encryption key is known only by the data owner
  - ✓ The KMD infrastructure is storing ”raw data”
- **Accounting of used resources**
  - ✓ Equiped with accounting system (average monthly amount of data, ...)

Architecture



Example of usage - FTP/SCP clients



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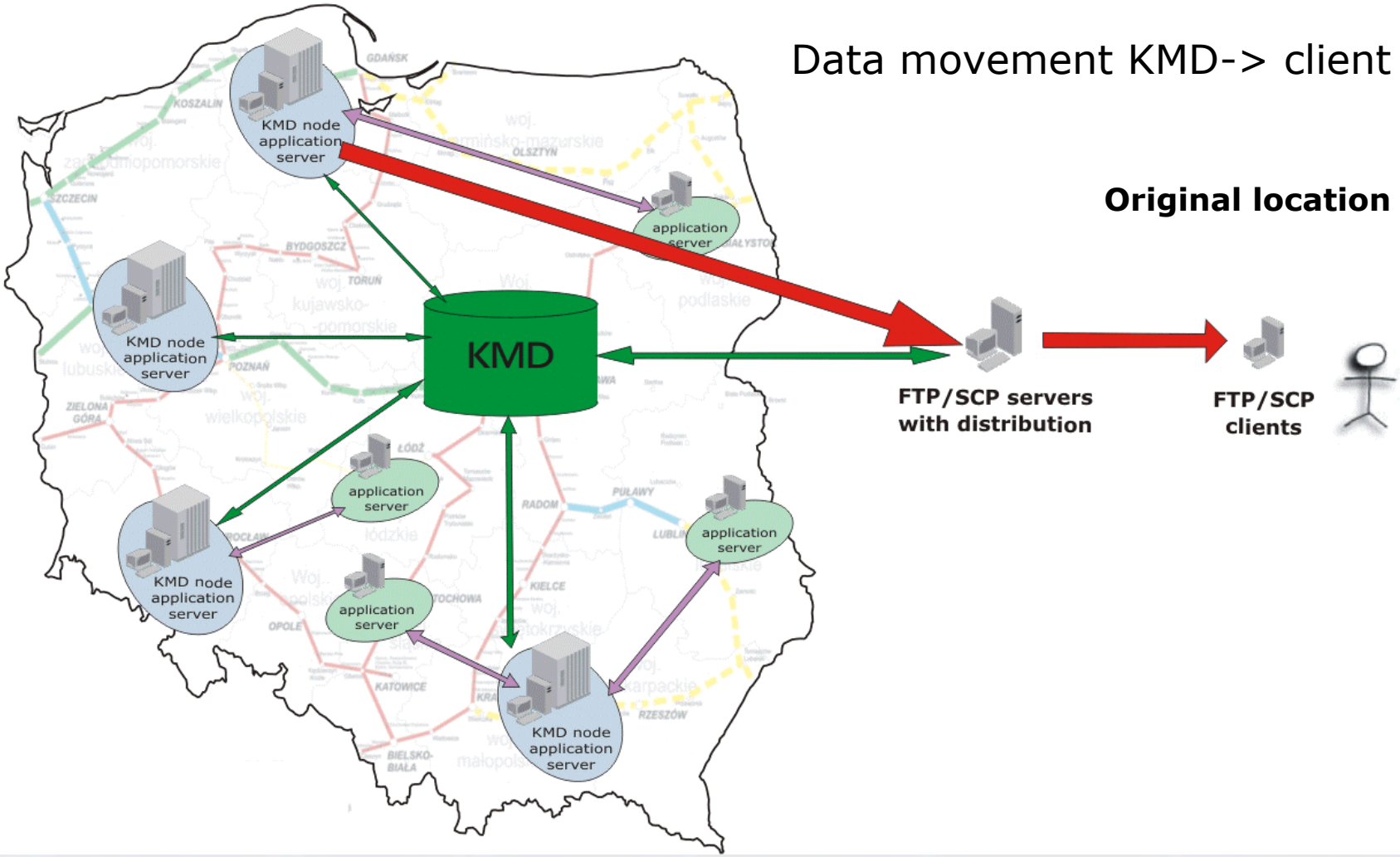

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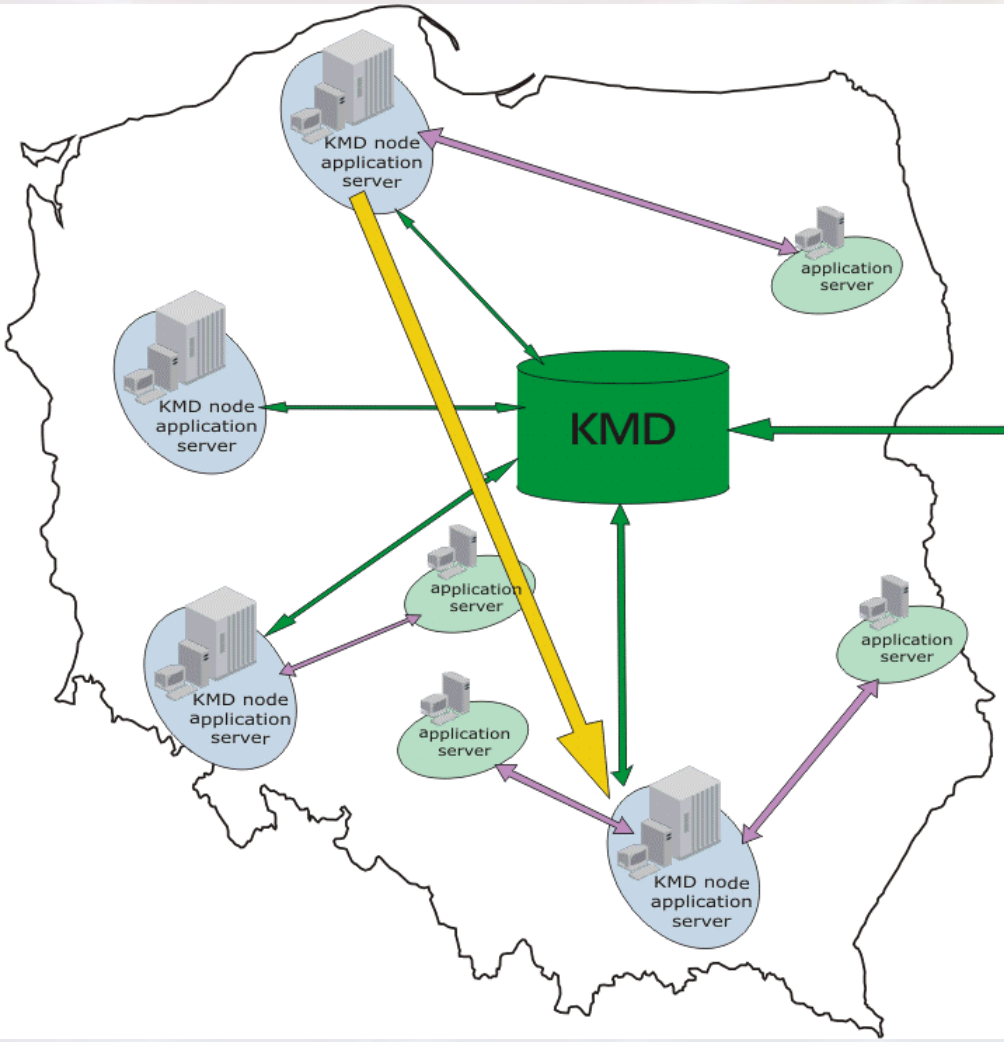


Data Replication

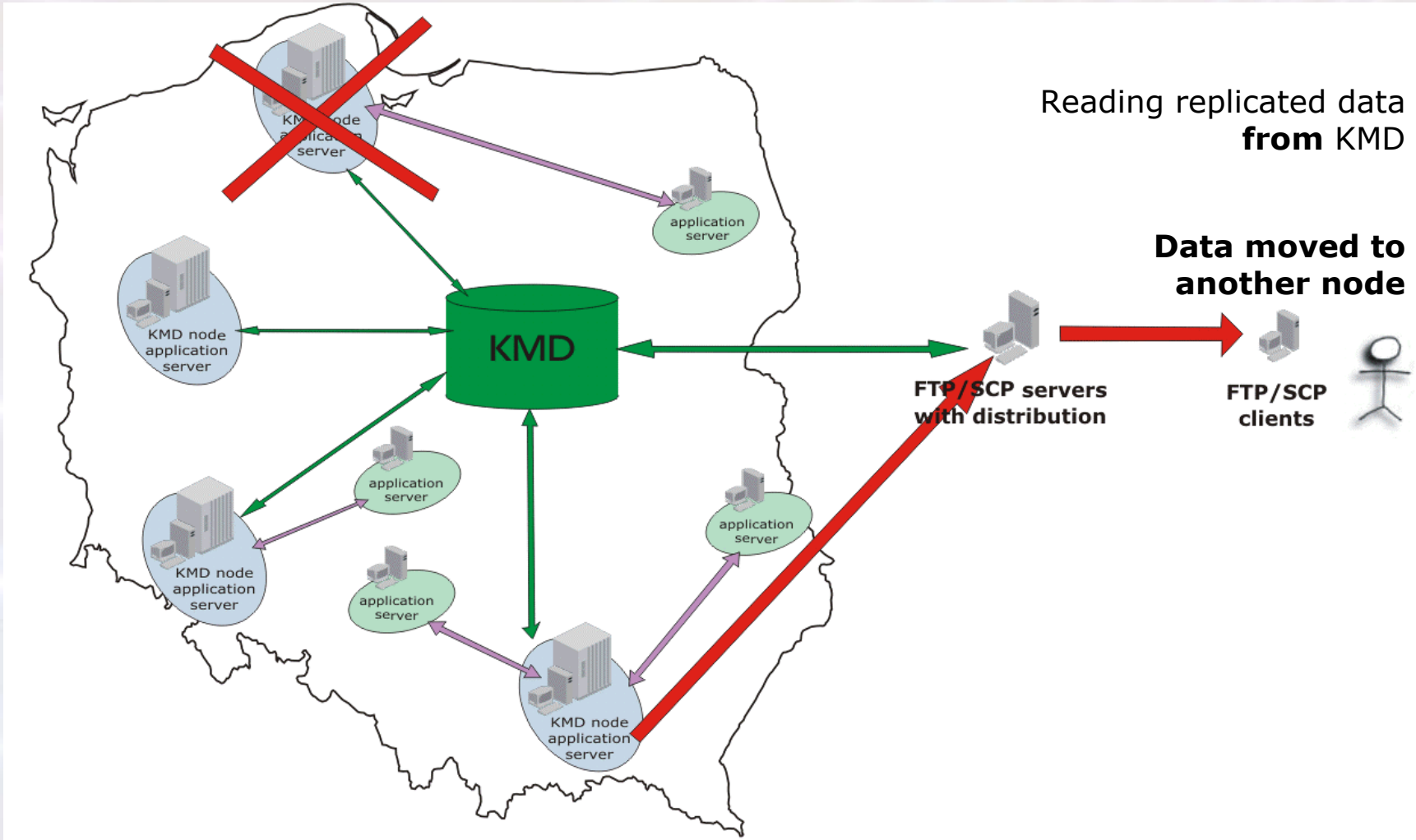
Done off-line

Depends on the predefined management policy

FTP/SCP servers with distribution

FTP/SCP clients

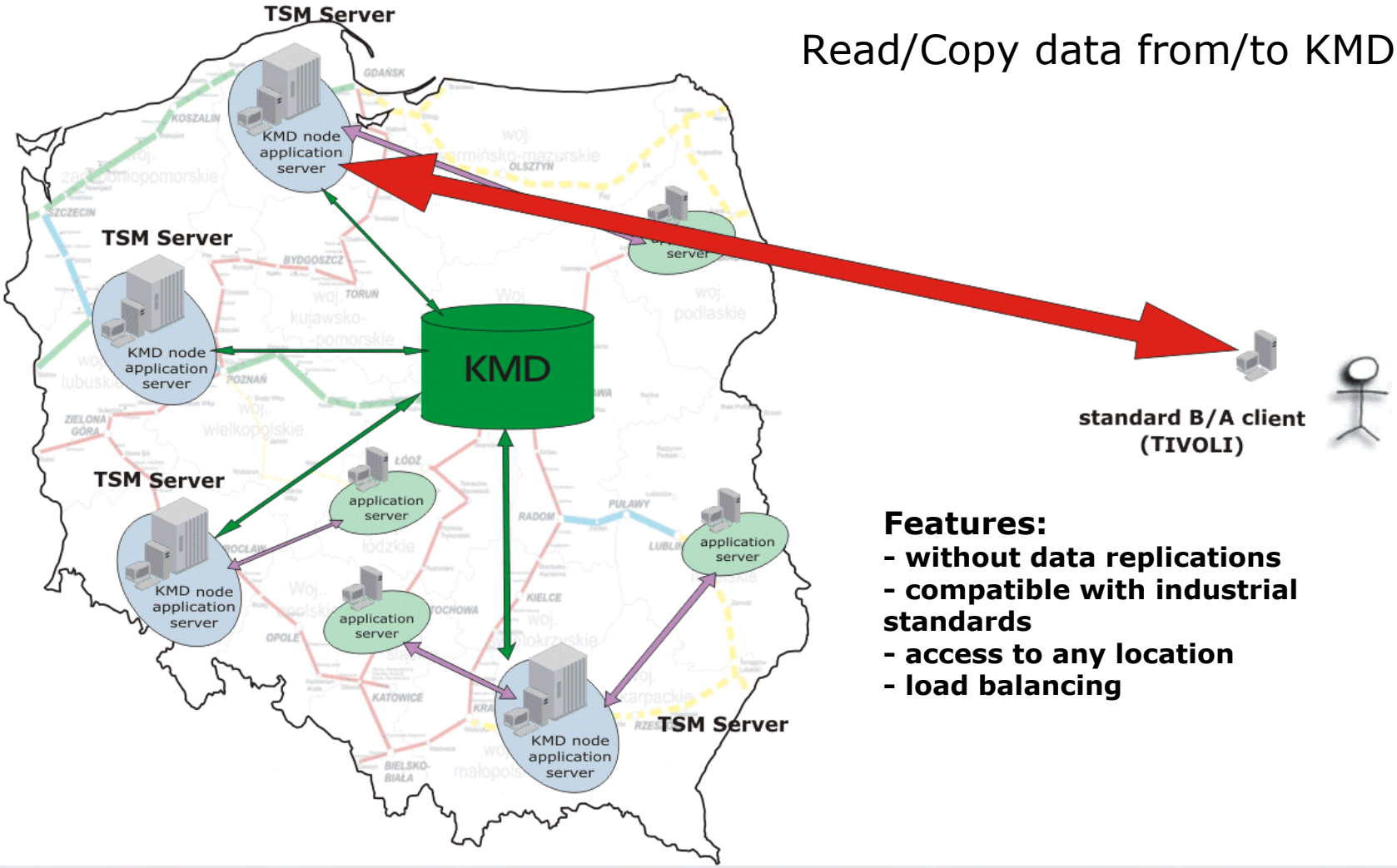
Example of usage - FTP/SCP clients



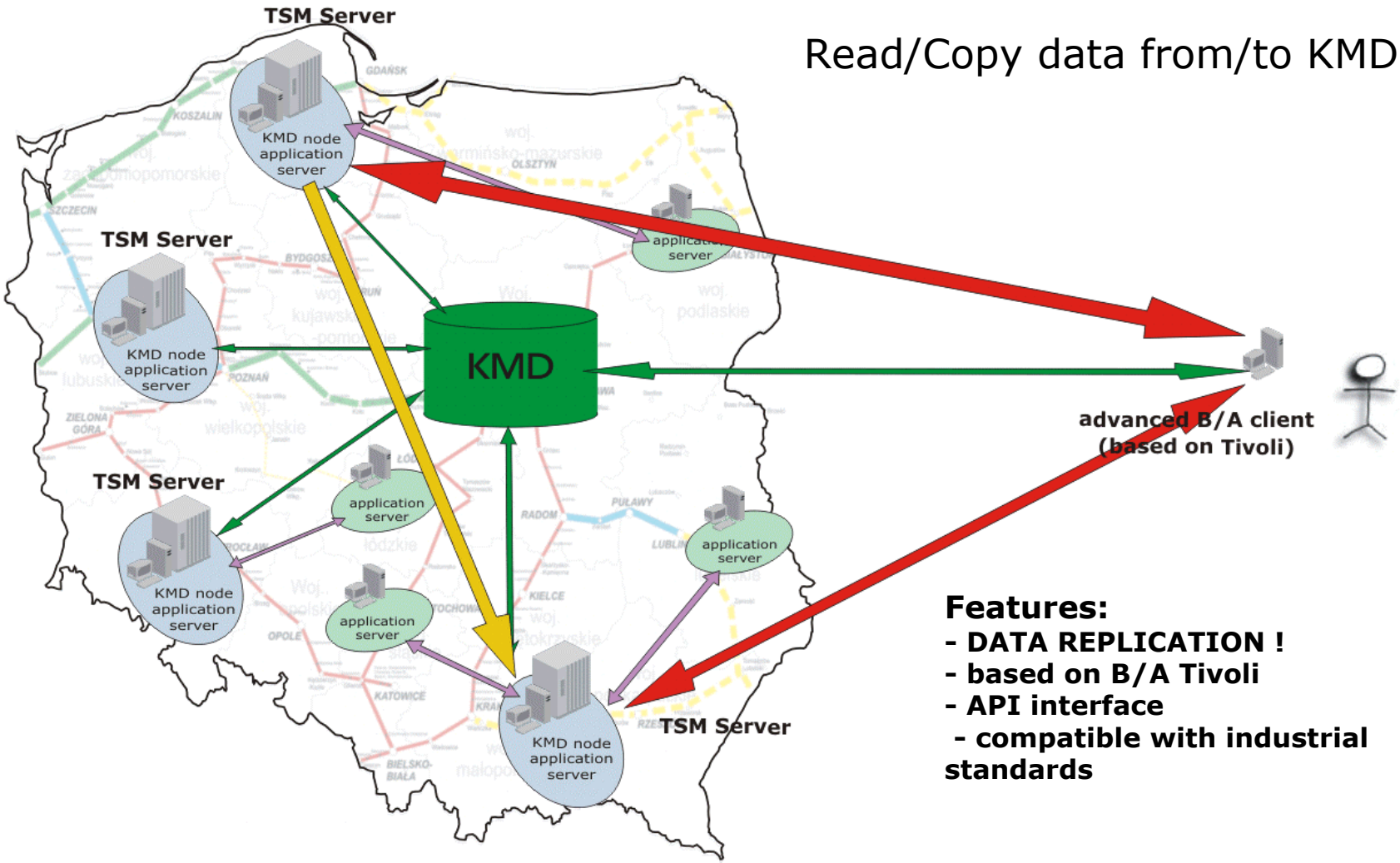
Reading replicated data **from** KMD

Data moved to another node

Supporting industrial standards – TSM (Tivoli) client



Example – advanced B/A client

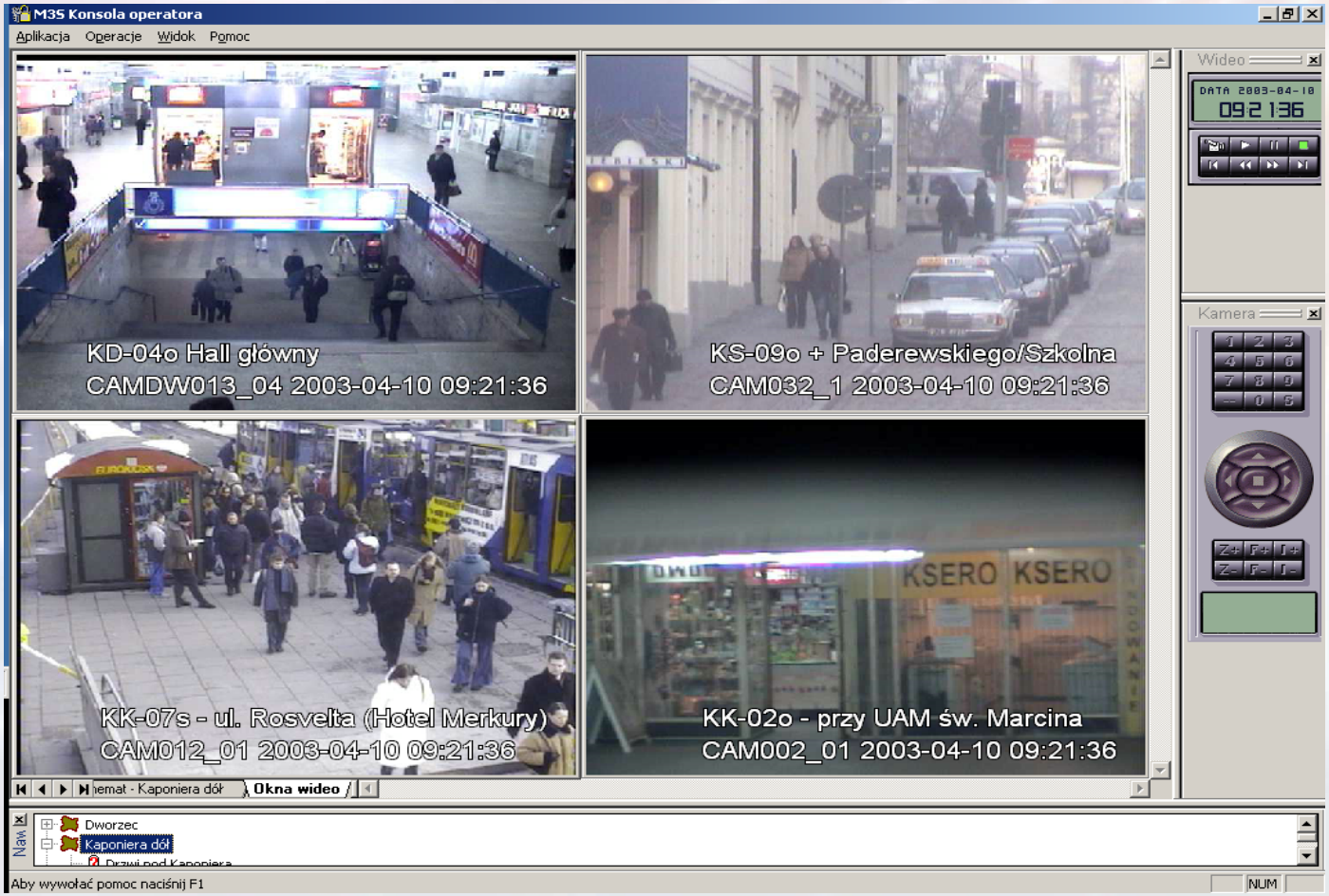


Read/Copy data from/to KMD

Features:
- **DATA REPLICATION !**
- **based on B/A Tivoli**
- **API interface**
- **compatible with industrial standards**

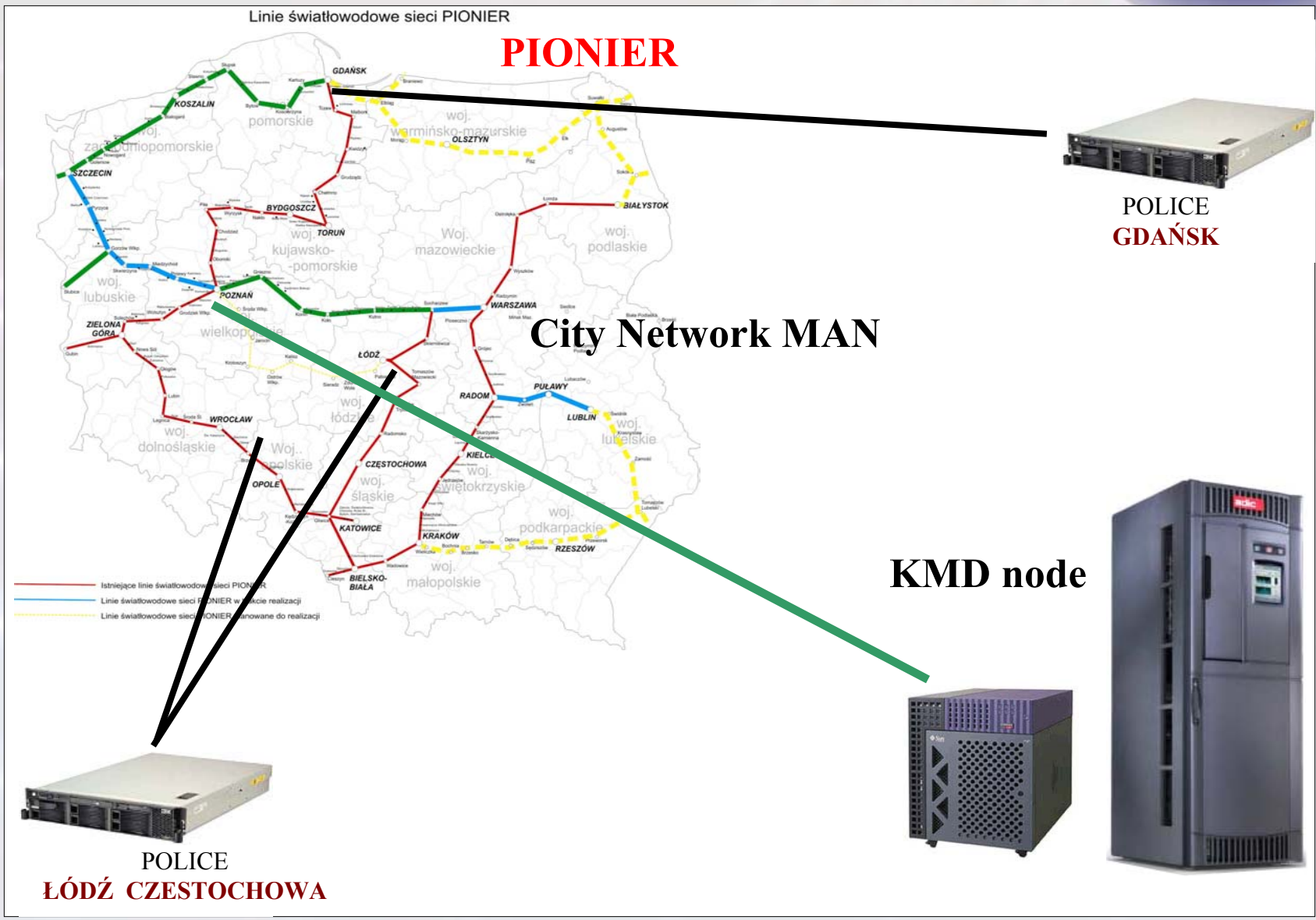
End users – Video Monitoring System

2004 – 70 cameras
2005 – 85 cameras
finally 200



15 TB – now
... 50 TB

backup window
23 days only!


Linie światłowodowe sieci PIONIER
PIONIER
GDAŃSK
KOSZALIN
SZCZECIN
BYDGOSZCZ
TORUŃ
OLSZTYN
BIAŁYSTOK
POZNAŃ
WARSZAWA
ZIELONA GÓRA
ŁÓDŹ
RADOM
PUŁAWY
LUBLIN
WROCŁAW
CZĘSTOCHOWA
OPOLE
KATOWICE
KRAKÓW
RZESZÓW
BIELSKO-BIAŁA
City Network MAN
KMD node
POLICE
GDAŃSK
POLICE
ŁÓDŹ CZESTOCHOWA

Summary

- **User point of view**
  - Reliable + Secure + User friedly
  - It must be cheap
- **Service Provider**
  - **Scalable + efficient**
  - **'Easy ' to manage**
- **Network demands:**
  - Nowadays: dedicated channels
  - Future: bandwidth on demand, qos
    - » Backbone infrastructure (p2p)
    - » User access

Thank YOU !

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