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Worldwide Trends and Best Practices

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Patrick Bodnar

VP Russia & CIS

Outline

- Number Portability implementation options
  - Technical Approach
  - Database Options
- Worldwide Trends
- Key Impacts to Porting Rates
- Success Factors
- Best Practices

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Number Portability Technical Solutions

Country	Technical Method
Australia	Direct-ACQ
Austria	Direct-ACQ
Belgium	Direct-ACQ
Canada	Direct-ACQ
Croatia	Direct-ACQ
Cyprus	Direct-ACQ
Czech Republic	Direct-ACQ
Denmark	Direct-ACQ
Egypt	Direct-ACQ
Estonia	Direct-ACQ
Finland	Direct-ACQ
France	Direct-ACQ
Germany	Direct-ACQ
Greece	Direct-ACQ
Hong Kong	Indirect
Hungary	Indirect/Query on Release
Iceland	Direct-ACQ
Ireland	Direct-ACQ
Israel	Direct ACQ
Italy	Direct-ACQ
Japan	Indirect/Onward Routing
Latvia	

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Number Portability Technical Solutions

Country	Technical Method
Lithuania	Direct-ACQ
Luxembourg	Direct-ACQ
Macau	Direct-ACQ
Malta	Direct-ACQ
Netherlands	Direct-ACQ
New Zealand	Direct-ACQ
Norway	Direct-ACQ
Oman	Indirect/Onward Routing
Pakistan	Direct-ACQ
Poland	Direct-ACQ*
Portugal	Indirect/Query on Release
Singapore	Direct-ACQ*
Slovakia	Indirect/Onward Routing
Slovenia	Direct-ACQ
Saudi Arabia	Direct-ACQ
South Africa	Direct-ACQ
South Korea	Direct-ACQ
Spain	Indirect/Onward Routing
Sweden	Direct-ACQ
Switzerland	Indirect/Onward Routing
Taiwan	Direct-ACQ
UK	Indirect/Onward Routing*
USA	Direct-ACQ

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Number Portability Database Models

Centralized Database model

- Serves as a common infrastructure for ordering, provisioning and notification processes
  - Single/centralized reference database containing mapping data of Ported numbers and their respective Routing numbers

Distributed Database model

- Separate databases representing multiple subsets of total data generally managed by each network operator individually
  - Subsets of data typically reside at different locations

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Mobile Number Portability Database Models

Country	Database Type
Australia	Centralized
Austria	Distributed
Belgium	Centralized
Canada	Centralized
Croatia	Centralized
Cyprus	Distributed
Czech Republic	Centralized
Denmark	Centralized
Egypt	Centralized
Estonia	Centralized
Finland	Centralized
France	Centralized
Germany	Centralized
Greece	Centralized
Hong Kong	Distributed
Hungary	Centralized
Iceland	Centralized
Ireland	Centralized
Israel	Centralized
Italy	Centralized
Japan	Distributed
Latvia	Centralized

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Mobile Number Portability Database Models

Country	Database Type
Lithuania	Centralized
Luxembourg	Centralized
Macau	Centralized
Malta	Distributed
Netherlands	Centralized
New Zealand	Centralized
Norway	Centralized
Oman	Distributed
Pakistan	Centralized
Poland	Distributed
Portugal	Centralized
Singapore	Centralized*
Slovakia	Distributed
Slovenia	Centralized
Saudi Arabia	Centralized
South Africa	Centralized
South Korea	Distributed
Spain	Distributed
Sweden	Centralized
Switzerland	Centralized
Taiwan	Centralized
UK	Distributed*
USA	Centralized

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MNP Deployment - America

Country	08 Population (million)	08 Mobile Subs (thousand)	08 Mobile Penetration	MNP Deployment Date	Time to Port	Porting Charge
Brazil	191.97	150,641.0	78%	2008.09.01	3 Days	4 BRL
Canada	33.487	21,455.0	64%	2007.03.14	2 hours	Free
Dominican Republic	9.95	7,210.5	72%	2009.09.30	3–10 Days	80 DOP
Ecuador	13.48	11,542.1	86%	2009.10.12	4 Days	Free
Mexico	108.56	75,305.3	69%	2008.07.05	2-13 Days	1 USD
Peru	28.84	20,951.8	73%	2010.01.01	7-9 Days	Free (but 15 PEN for new SIM)
USA	308.505	285,610.6	93%	2003.11.24	2 hours	Free (but monthly NP surchage)

MNP Deployment – Asia Pacific

Country	08 Population (million)	08 Mobile Subs (thousand)	08 Mobile Penetration	MNP Deployment Date	Time to Port	Porting Charge
Australia	21.07	22,120.0	105%	2001.09.25	3 hours	Free
Hong Kong	6.98	11,580.1	166%	1999.03.01	1.5 Days	Free (plus call forwarding)
Japan	127.29	110,395.0	87%	2006.10.24		2,100 Yen
Macau	0.55	933.0	170%	2001		
Malaysia	27.01	27,713.0	103%	2008		
New Zealand	4.23	4,620.0	109%	2007.04		
Pakistan	176.95	88,019.7	50%	2007.03.23	4 Days	
Singapore	4.62	6,375.5	138%	2008.06.13	1 Day	
South Korea	48.15	45,607.0	95%	2004.01	30 mins	1,000 KRW
Taiwan	23.04	25,412.5	110%	2005.10.13	1 Day	

- Singapore was the 1st one to launch MNP in the world (1997 with call forwarding)
- South Korea is the one with shortest time to port (30 mins) in the world
- India MNP launched Jan 2011
- Only country has decided to select 2 CSMS/NPAC vendors
- Thailand MNP launched by February of 2011

MNP Deployment – Europe

Country	08 Population (million)	08 Mobile Subs (thousand)	08 Mobile Penetration	MNP Deployment Date	Time to Port	Porting Charge
Austria	8.34	10,816.0	130%	2004.05	3 Days	19
Belgium	10.59	11,822.2	112%	2002.10	2 days	Free
Bulgaria	7.58	10,500.2	139%	2008.04		€ 2.56
Croatia	4.42	5,879.8	133%	2005.10		5.3
Cyprus	0.86	1,016.7	118%	2004.07	6 days	9.7
Czech Republic	10.32	13,780.2	134%	2006.01.15	5 Days	
Denmark	5.46	6,862.0	126%	2001.07	30-60 Days	0-29 DKK
Estonia	1.34	2,524.5	188%	2005.01.01	5 Days	
Finland	5.3	6,830.0	129%	2003.07.25	5 Days	Free
France	62.04	57,972.0	93%	2003.06	7 days	Free
Germany	82.26	105,523.0	128%	2002.11.01	5 Days	€25 (up to €30.72)
Greece	11.14	13,799.3	124%	2004.03	12 days	
Hungary	10.01	12,224.2	122%	2004	6 days	Free
Ireland	4.44	5,357.0	121%	2003	2 hours	Free
Italy	59.6	90,341.0	152%	2002.01.15	3 Days	10
Latvia				2006	10 Days	Free
Lithuania	3.32	5,022.6	151%	2005	5 Days	
Luxembourg	0.48	707.0	147%	2005.02.01	1 Days	
Macedonia				2008.09.01		
Netherlands	16.53	20,627.0	125%	1999.01	10 days	9.08
Norway	4.77	5,250.9	110%	2001.04.01	5 Days	10 NOK
Poland	38.1	43,926.4	115%	2006.02	8 days	Free
Portugal	10.68	14,909.6	140%	2002.01.01	13 days	15
Romania	21.36	24,467.0	115%	2008.10.21	7-30 Days	Free
Slovak Republic	5.4	5,520.0	102%	2004.05	20 days	10
Slovenia	2.02	2,054.9	102%	2005	7 days	5 EUR
Spain	44.49	49,677.5	112%	2000.12	5 days	
Sweden	9.2	10,892.0	118%	2001.09.01	5 days	Free
Switerland	7.54	8,896.7	118%	2000.03	15-30 days	18.62
Turkey	73.91	65,824.1	89%	2008.11.09	6 Days	Free
United Kingdom	61.23	77,360.8	126%	1999.01	5 Days	Free

- MNP is a mandate from EU
- All major European countries have implemented MNP
- Some of the European countries have the longest time-to-port (60 days), the highest porting charge (30 euro)

MNP Deployment – Mid East and Africa

Africa & Mideast

Country	08 Population (million)	08 Mobile Subs (thousand)	08 Mobile Penetration	MNP Deployment Date	Time to Port	Porting Charge
Egypt	81.53	41,272.5	51%	2008.04		
Israel	7.05	8,982.0	127%	2007.12.03	3–4 hours	Free
Jordan	5.95	6,010.0	101%	2010.06.01	1 Day	7 JOD
Nigeria	151.21	62,988.5	42%	2011		
Oman	2.79	3,219.3	115%	2006.08.26	3 days	
Saudi Arabia	25.2	36,000.0	143%	2006.07.08	5 days	

- Least developed MNP market in the world, in terms of deployments and ported numbers
- Several Africa countries are in process of implementing MNP

Key Impacts to NP Porting Rates

- Time to Port
  - » Reducing time to port generally increases the adoption of porting
  - » At the other extreme, it's less clear that reducing the time to port beyond a few hours results in any material improvement in MNP adoption rates
- Porting Process
  - » Manual, complicated, time-consuming processes for end-users need to be avoided
  - » Need to balance convenience with security to keep rejection rate at minimum
- End-user Porting Charges
  - » Higher porting charges will lead to lower porting rates
  - » However, a small porting charge doesn't inhibit the adoption rate

NP Implementation – Best Practices

- Regulatory mandates are required to motivate the industry to act on LNP and must define:
  - Database Method for Number Portability Implementation
  - Database Architecture and Administration
  - Deployment Measures
  - Cost Recovery
- Industry involvement is critical for success to:
  - Develop Business Rules for Porting Processes
  - Collaboration on New Technology and Supporting Implementation Requirements

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NP Implementation – Best Practices

Success factors:

- Maximize the amount of stakeholder awareness and buy-in to the NP Program
- Create positive perceptions of the NP Program by highlighting benefits to Operators
- Consistent flow of information across business lines is critical to the success of the NP Program. It is important to educate and inform all employees on NP, ensuring that there is a constant communication stream at all levels of the NP Program.
- Educate, inform and dispel misinformation and rumors
- Provide a vehicle for customer feedback
- Communication Road Show to promote NP across the country
- Manage Customer expectations
- Limit validation fields. The more validation, the higher the Fallout

US Model

FCC Criteria

LNP Minimum Performance Criteria

- Support existing network services, features and capabilities
- Efficiently use numbering resources
- Not require end users to change their telecommunications numbers
- Not require telecommunications carriers to rely on databases, other network facilities, or services provided by other telecommunications carriers in order to route calls to proper termination point
- Not result in unreasonable degradation in service quality or network reliability when implemented
- Not result in any degradation of service quality or network reliability when customers switch carriers
- Not result in a carrier having a proprietary interest
- Be able to accommodate location and service portability in the future
- Have no significant adverse impact outside areas where number portability is deployed

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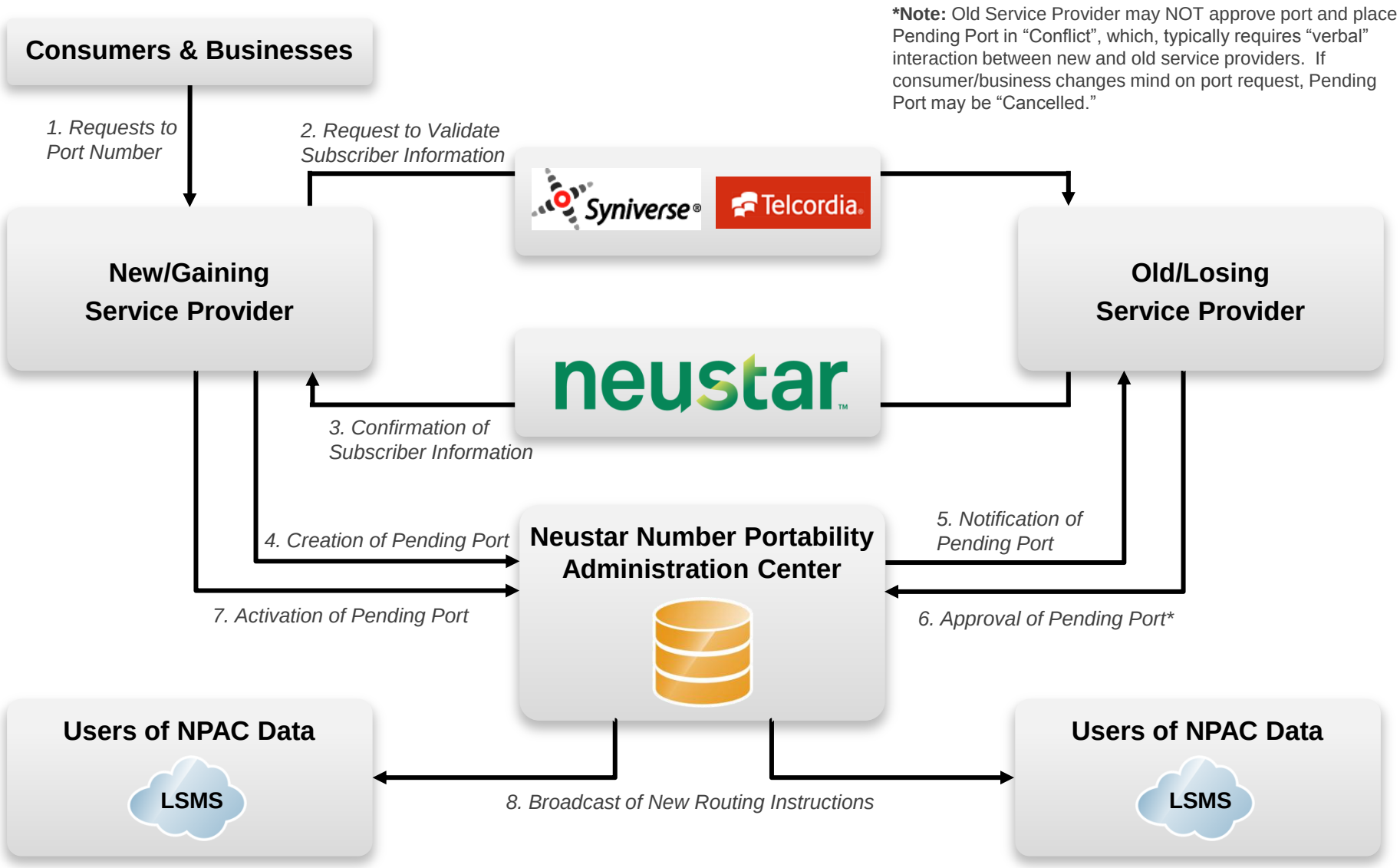
How Local Number Portability Works



***Note:** Old Service Provider may NOT approve port and place Pending Port in "Conflict", which, typically requires "verbal" interaction between new and old service providers. If consumer/business changes mind on port request, Pending Port may be "Cancelled."

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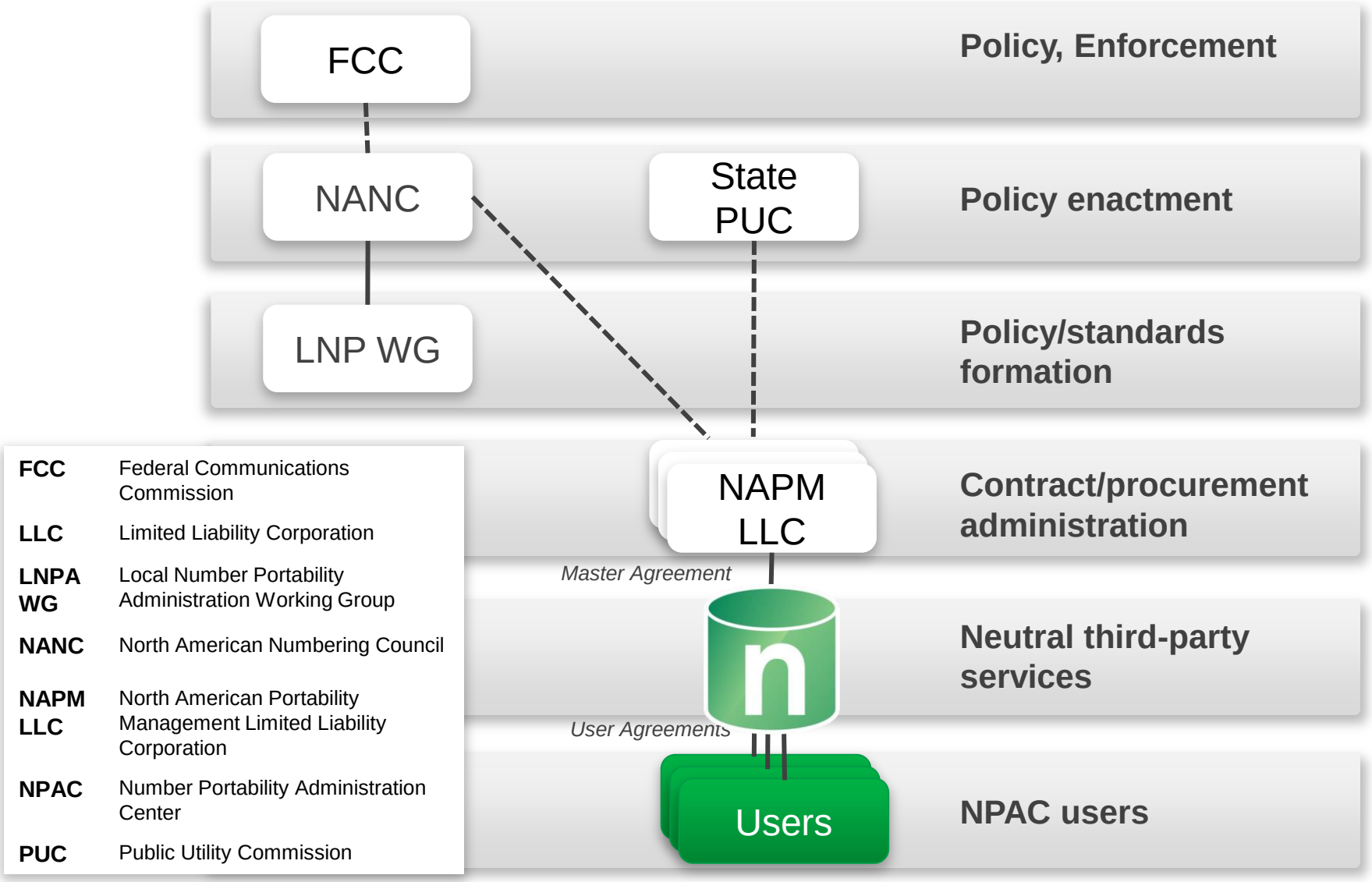
U.S. Governance Model Key to Success



FCC Neutrality Criteria

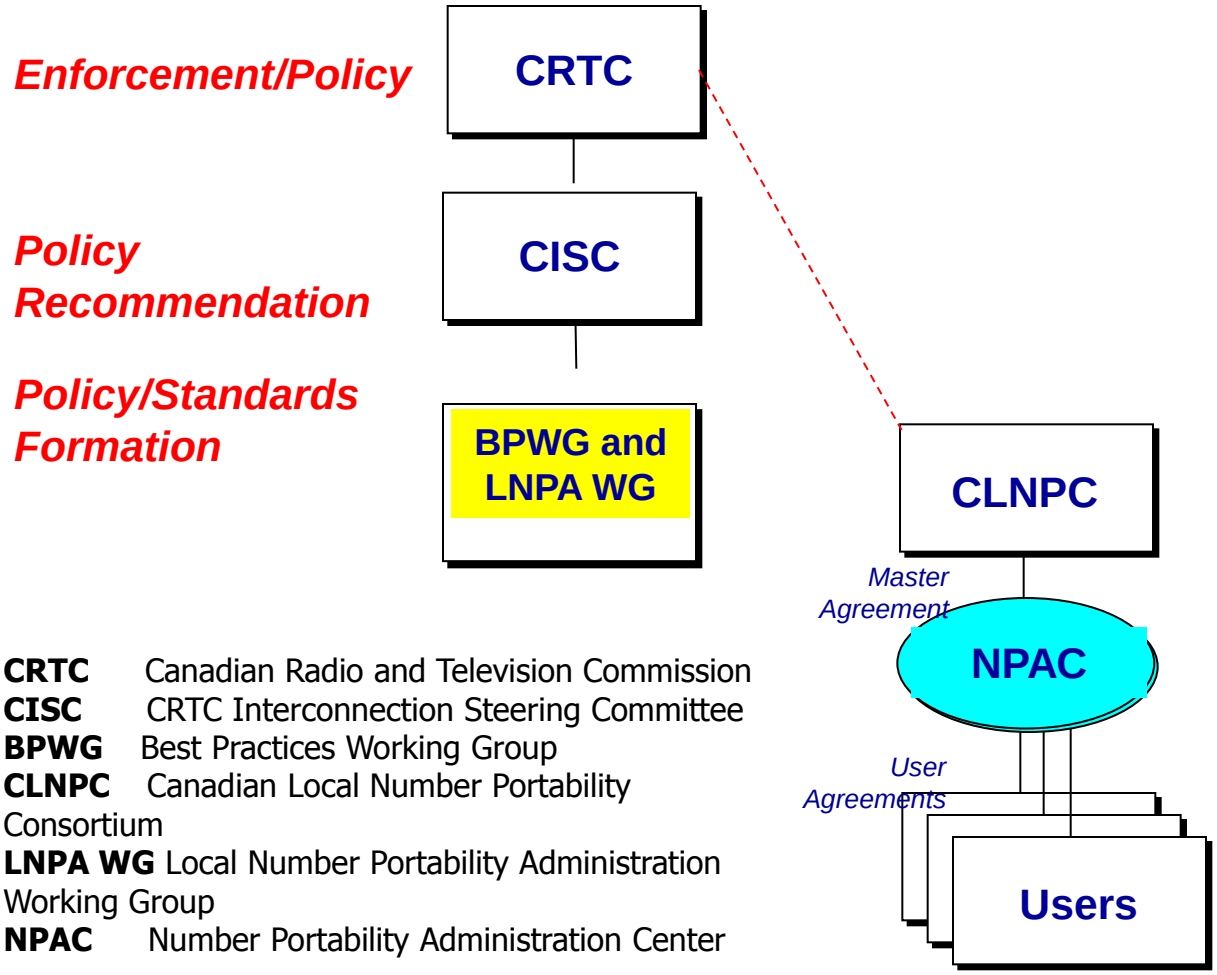
- Shall be an independent and impartial non-government entity
- May not be an affiliate of any telecommunications service provider
  - » “Affiliate” is a person who controls, is controlled by, or is under the direct or indirect common control with another person
- Shall not be aligned with any particular telecommunication industry segment
- Not to be subject to undue influence by parties with a vested interest in the outcome
- May not issue a majority of its debt to, nor may it derive a majority of its revenues from, any telecommunications service provider

FCC Neutrality Criteria

- Any affiliate may not issue a majority of its debt to, nor derive a majority of its revenues from any telecommunications service provider;
  - An equity interest by stock, partnership (general or limited) interest, joint venture participation, or member interest in the other person ten (10%) percent or more of the total outstanding equity interests
  - The power to vote ten (10%) percent or more of the securities
  - The power to direct or cause the direction of the management and policies, whether through the ownership of or right to vote voting rights attributable to the stock, partnership (general or limited) interest, joint venture participation, or member interest) of such other person

Other Governance Models

Canada Governance Model - Key Components



CRTC Canadian Radio and Television Commission
CISC CRTC Interconnection Steering Committee
BPWG Best Practices Working Group
CLNPC Canadian Local Number Portability Consortium
LNPA WG Local Number Portability Administration Working Group
NPAC Number Portability Administration Center

Contract/Procurement Administration

Neutral Third Party Services

NPAC Users

Wireline, Wireless

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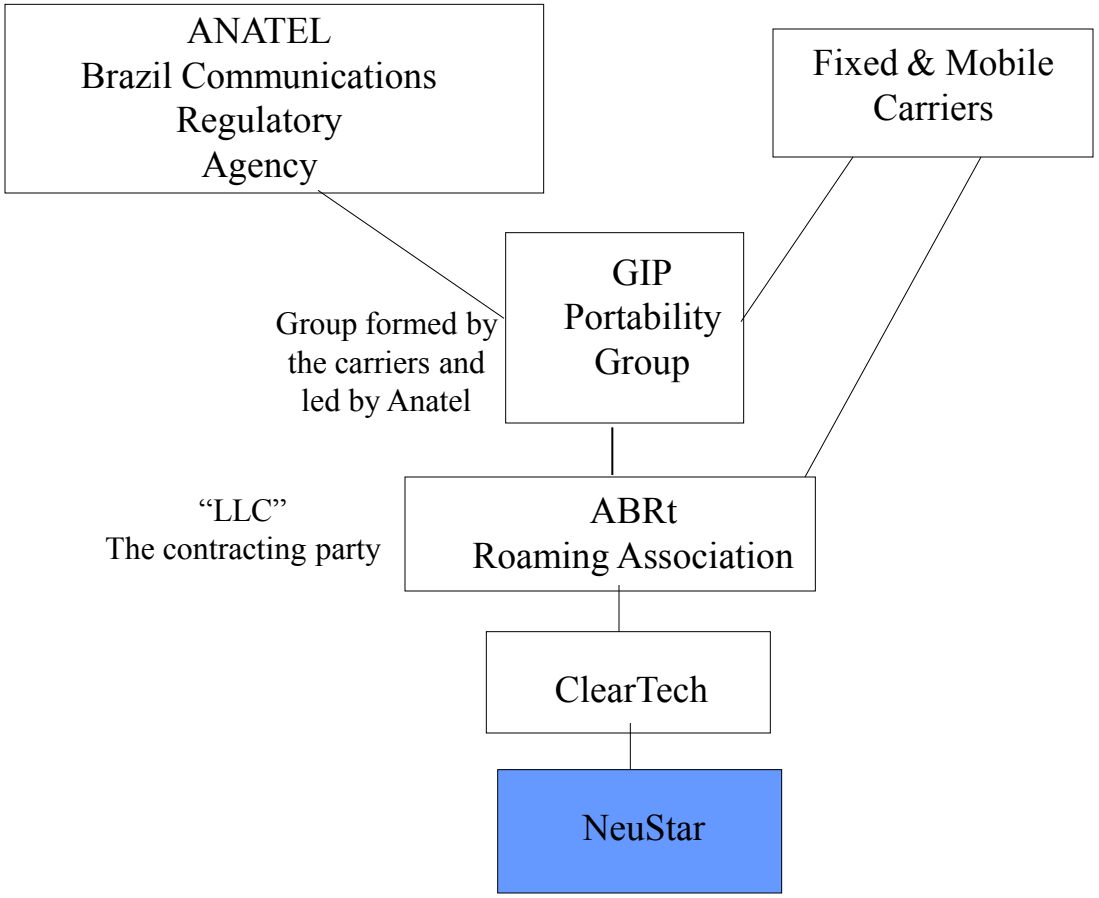
Brazil Governance Model

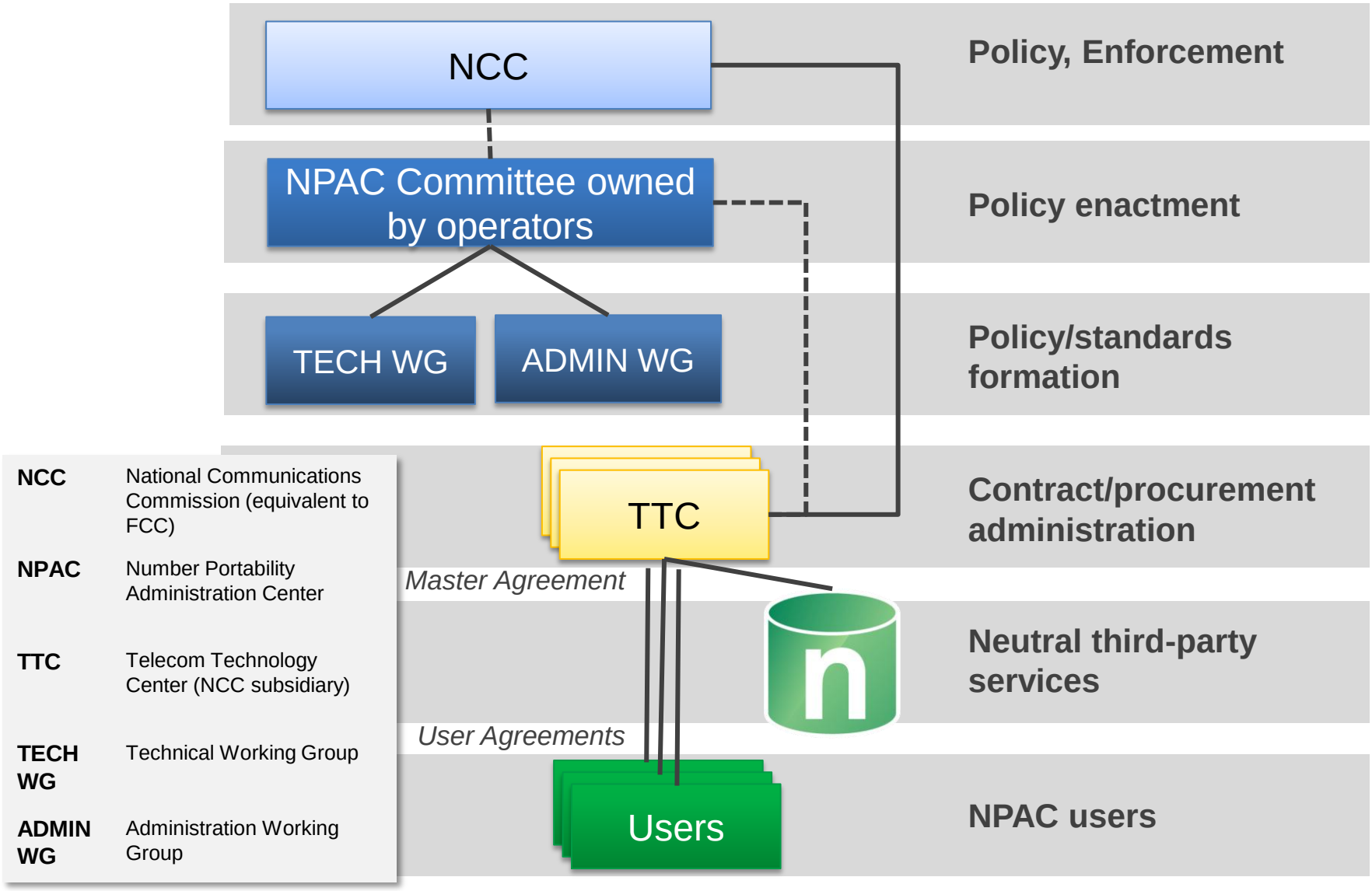
Brazil LNP Community of Interest



- NS contract is with ClearTech, local Brazilian partner
- 5 year contract
- System and Maintenance

- 180 M Population
- 110 M Mobile Lines
- 50 M Fixed Lines
- 4 carriers in each market

Taiwan Governance Model Key to Success



NCC	National Communications Commission (equivalent to FCC)
NPAC	Number Portability Administration Center
TTC	Telecom Technology Center (NCC subsidiary)
TECH WG	Technical Working Group
ADMIN WG	Administration Working Group

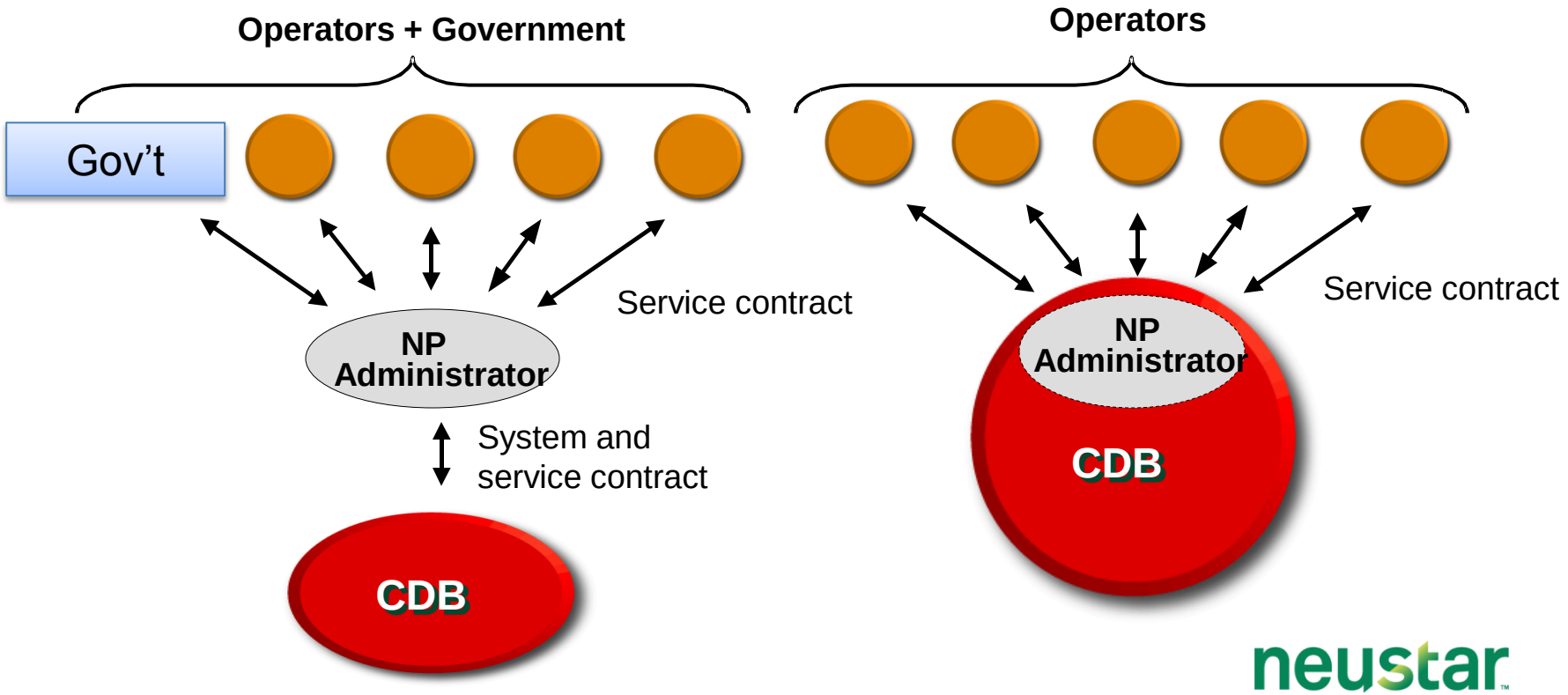
NP Administration Models

Consortium Administration

- NP Administrator organization (legal entity such as limited liability corporation) is set-up by Operators/Government
- Administrator has a single contract with supplier
- NP Administrator manages commercial service delivery with Operators

Direct Administration

- Supplier acts as administrator
- Operator consortium makes initial purchase decision
- NP Provision directly engaged from Supplier
- Each Operator signs a service contract with Administrator



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Charging Model Options

- Fixed Price
  - » Normally two components
    - Start-up fee to deploy the NP system
    - Monthly fixed fee to cover operations & maintenance
  - » Considerations
    - There has to be a contracting entity
    - How to split costs amongst participants in a fair & equitable manner?
      - For example, what about Transit Operators and other Telecom Service Providers and third parties enjoying benefits from Porting Data but never port a single number?
  - » Generally deployed in smaller countries

Charging Model Options

- Transaction Based
  - » No upfront investment needed, vendor takes risks
  - » Cost Recovery tied to either initiated or completed ports
  - » There might be guaranteed minimum requirements
  - » Only the operators who “benefit” from NP pay for NP
  - » Generally deployed in large countries

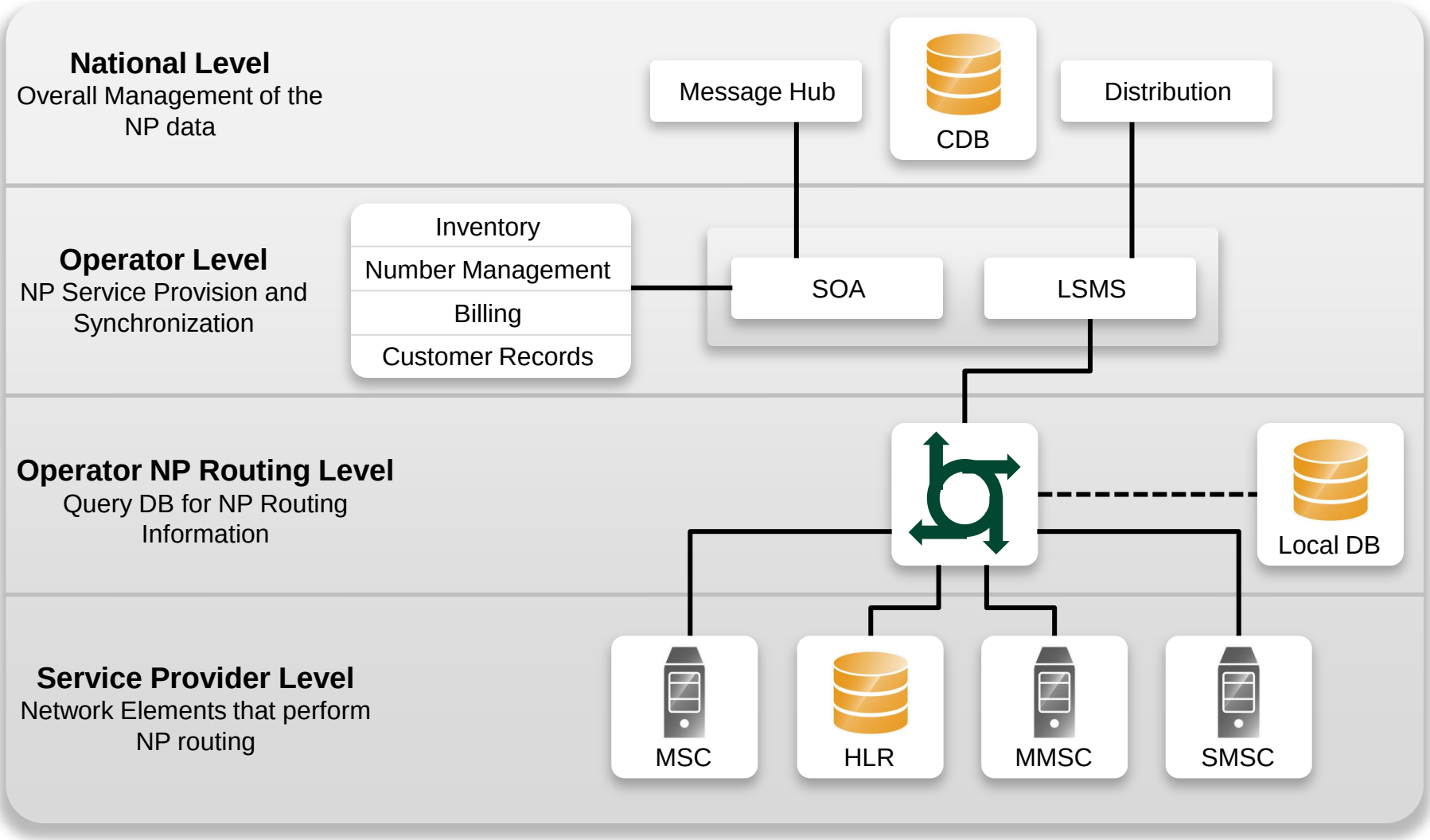
- Hybrid
  - » Start-up fee to deploy NP system (at least partial recovery)
  - » Transaction based fees to cover operations & maintenance

Neustar Model to International Number Portability

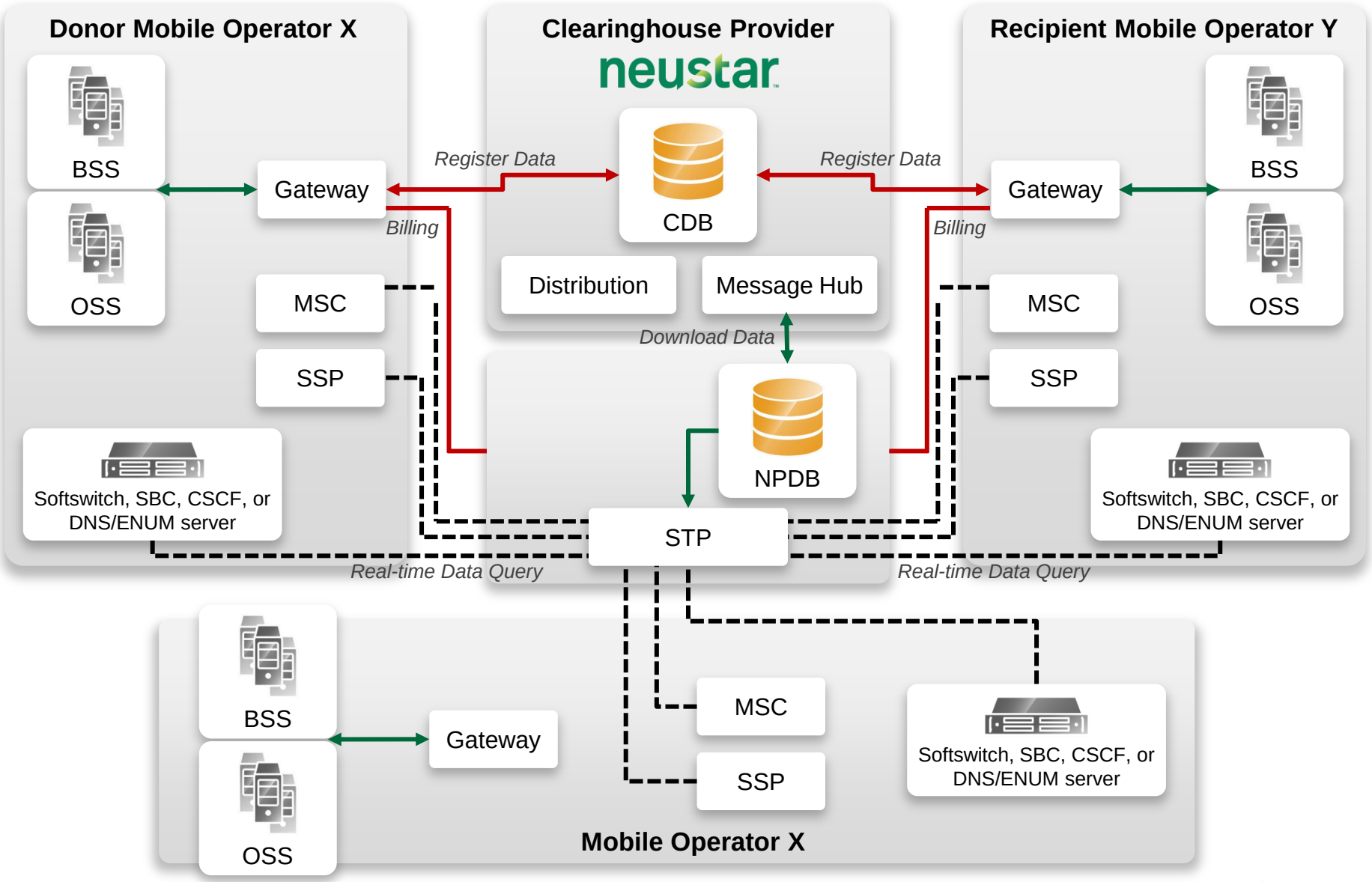
Neustar Approach to Number Portability and Central Reference Database (CRD)

- CRD is a key element for a successful NP implementation
- CRD is a Service Offering based on
  - » Core System
  - » Best Practices
  - » Managed Services
- CRD Characteristics
  - » Low-risk and rapid implementation
  - » Flexibility to support initial needs and accommodate future requirements
- Complete visibility and tight control of the entire project
- Meeting financial targets by having predictable costs

Centralized NP Solution Architecture



Query Based Solution Architecture



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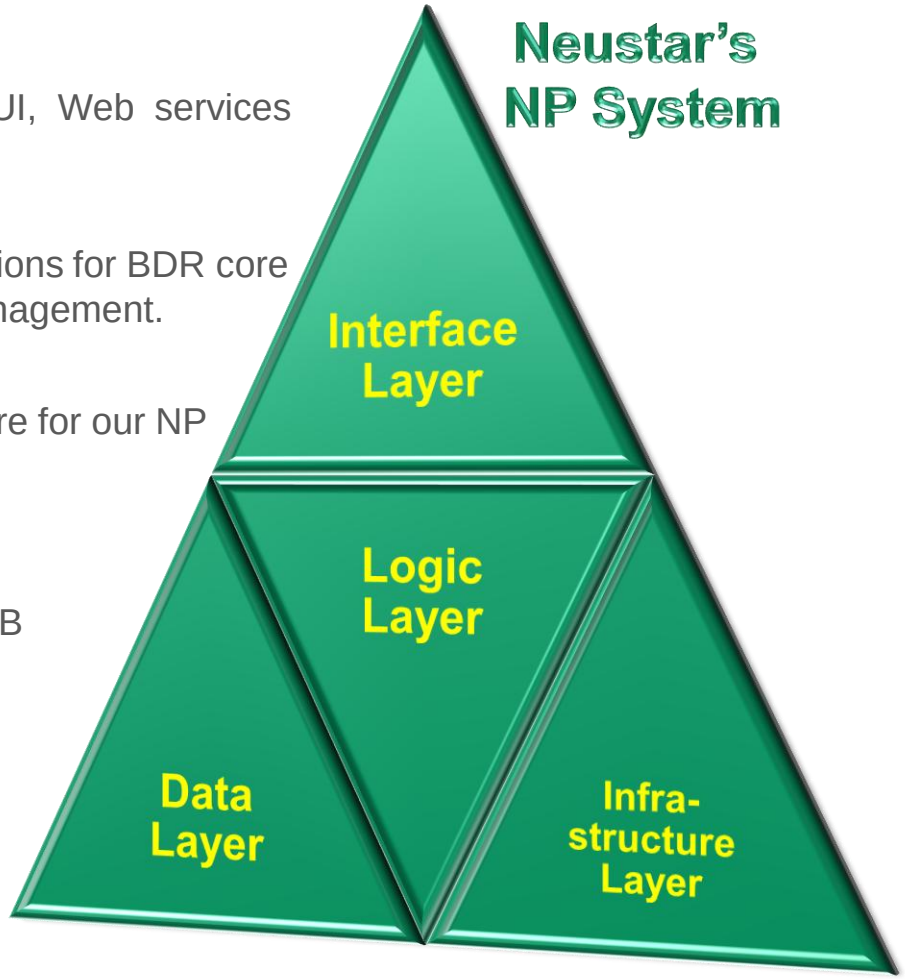
Neustar's Number Portability (NP) System

- **Our NP key components include:**
  - » Interface layer
    - Manual and M2M interfaces—Web -based GUI, Web services (SOAP/HTTPS), File-based (FTP).
  - » Logic layer
    - Business rules, customized software applications for BDR core services, reporting, notification/exception management.
  - » Data layer
    - Physical Data Base, DB management software for our NP Repository .
  - » Infrastructure layer
    - Network operation management systems, Performance & Health systems monitoring, DB interfacing software to allow on the fly emergency maintenance.



Questions and Answers.

Patrick Bodnar
+ 1 571 291 1200
patrick.Bodnar@neustar.biz

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