

Digital Television Switchover : A Case Study of South Korea

July 10, 2015

BONGKYU YI

Team Leader

Spectrum Re-farming Department



Contents

Part 1. Introduction to DTV Switchover

- The Reason for DTV Switchover
- The Present State of DTV Switchover Worldwide

Part 2. Case Study : South Korea

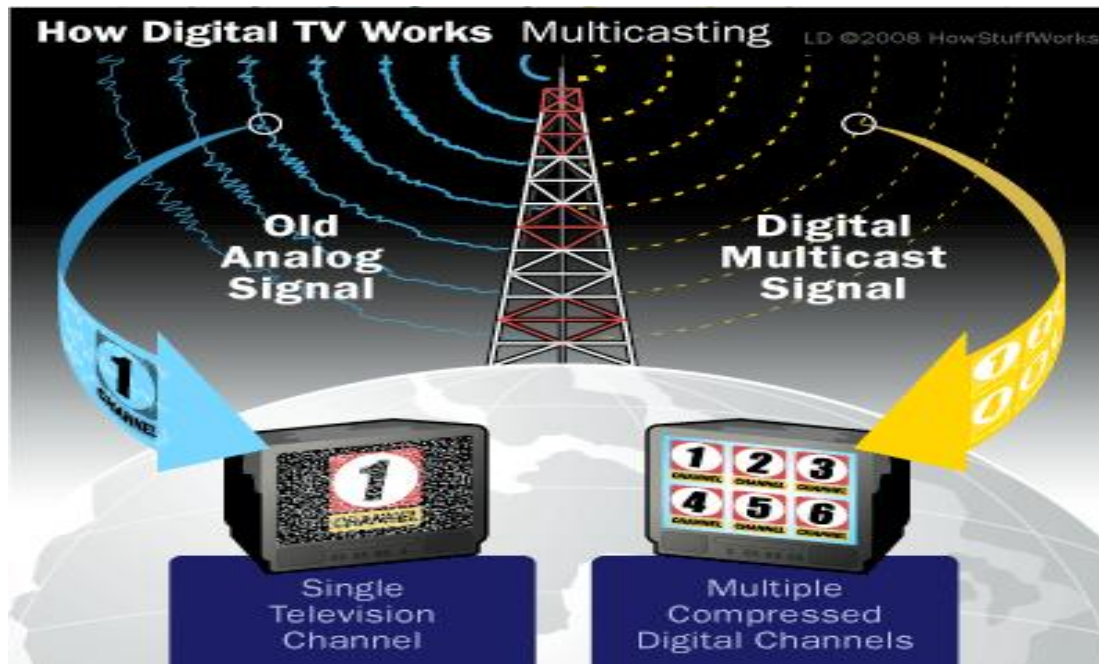
- History of DTV Switchover in Korea
- Issues and Challenges for DTV Switchover
- Solution to smooth DTV Switchover
- Conclusion

Part 1. Introduction to DTV Switchover

- The Reason for DTV Switchover**
- The Present State of DTV Switchover Worldwide**

■ What is DTV Switchover?

- Digital Television switchover (DTV switchover), also called analog switch-off, DTV transition, or DTV migration, is the process of shutting down existing Analog Television (ATV) broadcasting and changing to digital broadcasting.
- The reasons for DTV Switchover are to improve viewer welfare, to activate media industry and secure efficient spectrum use, e.g....



❖ How DTV works

Source: <http://electronics.howstuffworks.com/digital-converter-box2.htm>

The Reason for DTV Switchover

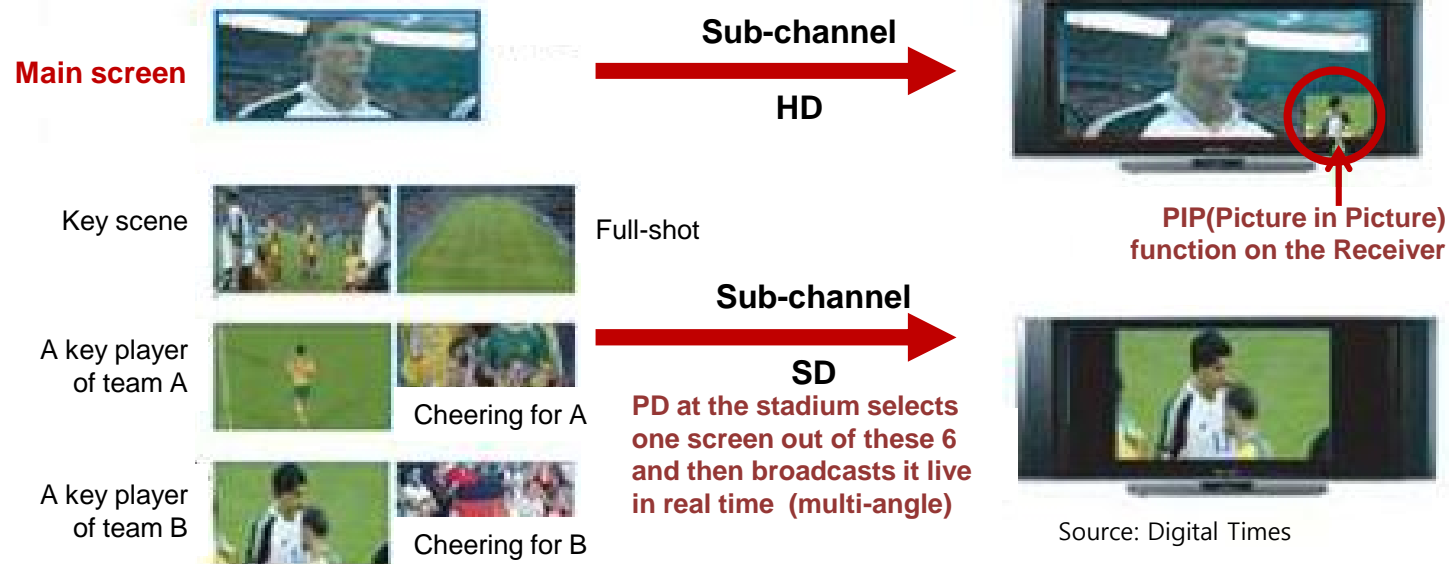
■ Improve Viewer Welfare Through High Quality Broadcasting

- DTV switchover can improve the viewing public's well-being by offering higher quality broadcasting services
- DTV switchover can Offer Multi-Mode Service (MMS) and interactive broadcasting service

❖ Comparison of Analog TV versus DTV

	Analog TV	Digital TV	
		SD	HD
Integrated services	-	Interactive, data broadcasting, T-commerce	
Picture ratio	4:3	4:3	16:9
Pixel	200,000	400,000	1,030,000
Sound quality	Radio	CD (5.1channel)	

❖ Example of MMS (Worldcup)



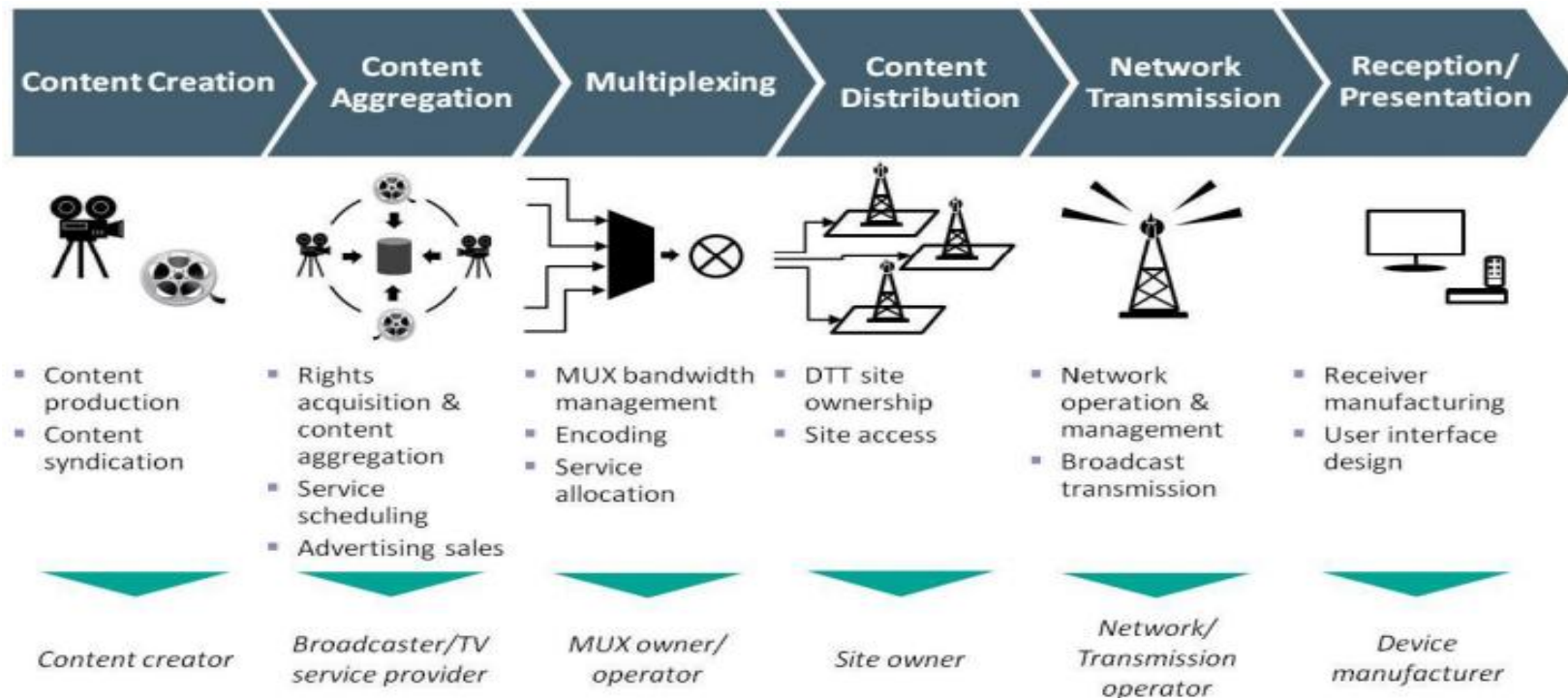
The Reason for DTV Switchover

■ Cultivate Media Industry and Economy

- Journeying throughout the digital broadcasting value chain, DTV switchover increases national economic growth by creating business needs and identifying emerging industries that contribute to economic performance .
- DTV switchover helps in job creation due to the enlargement of the digital content industry.

❖ Digital broadcasting value chain

Source : Farncombe & Plum, Benefits of digital broadcasting , 2014

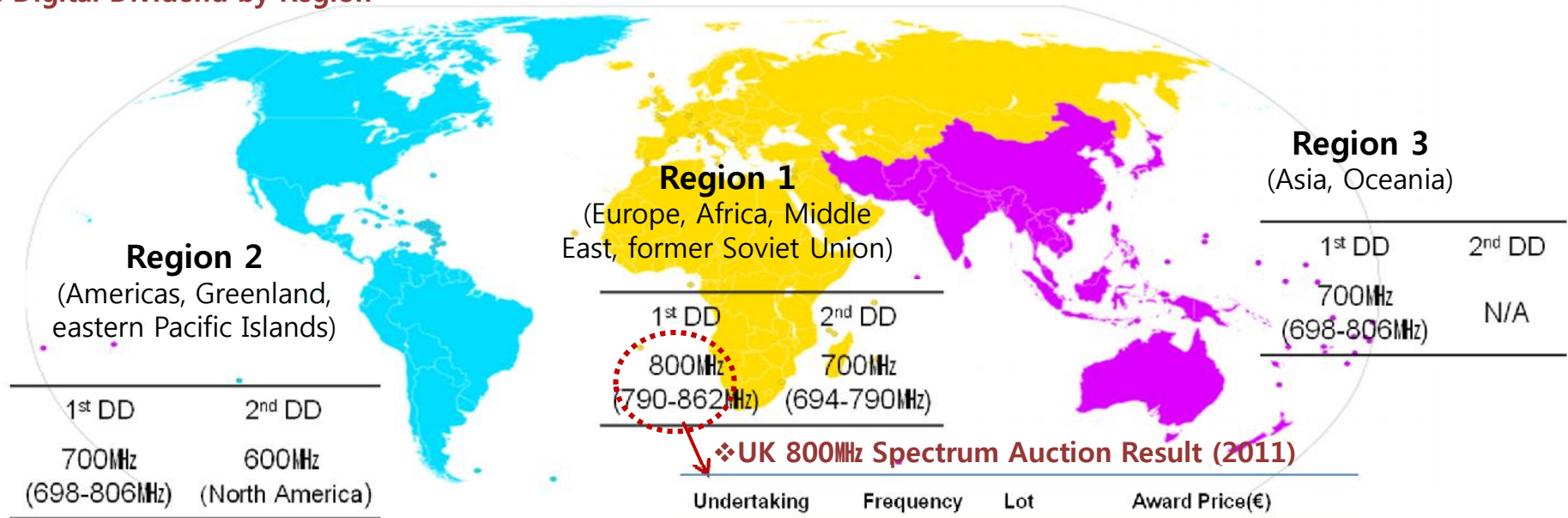


The Reason for DTV Switchover

Secure and Efficient Spectrum Use

- By acquiring the spectrum freed up by DTV switchover (known as the digital dividend), finite radio frequency resources can be used more efficiently.

❖ Digital Dividend by Region



❖ UK 800MHz Spectrum Auction Result (2011)

Undertaking	Frequency	Lot	Award Price(€)
Bouygues Telecom	791-801MHz / 832-842MHz	2×10MHz	683,087,000
SFR	801-811MHz / 842-852MHz	2×10MHz	1,065,000,000
Orange France	811-821MHz / 852-862MHz	2×10MHz	891,000,005
Total		60MHz	2,639,087,005

ITU regions: ■ Region 1 ■ Region 2 ■ Region 3

The Present State of DTV Switchover Worldwide

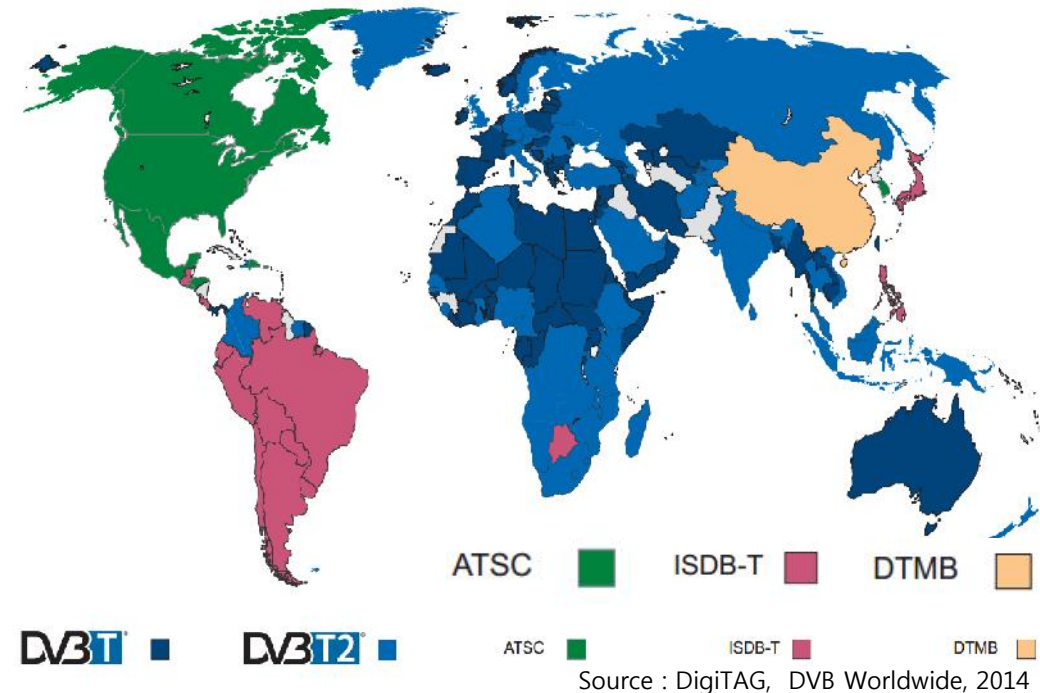
- DTV has been implemented in many countries around the world, with ATV broadcasting being switched off

❖ATV switch-off in various countries

Country	Year	Country	Year
Netherlands	2006	Taiwan	2012
Finland	2007	Tanzania	2012
Sweden	2007	UK	2012
Germany	2008	Australia	2013
Norway	2009	New Zealand	2013
US	2009	Poland	2013
Estonia	2010	South Africa	2013
Latvia	2010	Uganda	2013
Spain	2010	Malaysia	2015
Czech	2011	Thailand	2016
France	2011	Brazil	2016
Ireland	2012	Russia	2017
Italy	2012	Indonesia	2018
Japan	2012	Argentina	2019
South Korea	2012	Mexico	2022

- Among digital broadcasting standards, DVB is common worldwide except Korea adopting ATSC of US, Latin Americas following Japan's ISDB-T, and DTMB of China

❖DTV Standard worldwide



Source: DigiTAG, Guide to digital switchover, 2013
Rapa Report, 2013

AEGIS spectrum engineering, DTT Spectrum in Latin America, MAY 2010

Part 2. Case Study : South Korea

- History of DTV Switchover in Korea**
- Issues and Challenges for DTV Switchover**
- Solution to smooth DTV Switchover**
- Conclusion**

■ DTV Switchover Timeline

1997~2007	Lay the foundation of digital broadcasting infrastructure
2008	Go along the digital wave with legislation completed
2009	Pave the way for a successful switchover
2010	Identify success factors through pilot projects
2011	Narrow in on policy improvement focused on viewers
2012	Successfully complete ATV termination
2013	Relocate DTV channels and finalize DTV Switchover

■ The reasons for the low progress and delay in 1997~2007

- Conflicts and controversy over the selection of ATSC and DVB-T, Lack of powers to encourage, force and provide incentives to the related parties to proceed with DTV switchover according to a legal basis, strategic planning, organizational system, and funding

- To deal with stalled progress and delays, the Korean Government made up considerations.

Legislative Proceedings

- What is legislative environment for DTV Switchover?
- What contents should be in legislation for DTV switchover?

Strategic Development

- What is the rationale for setting up a strategy development framework?
- How can we make steady progress and proceed with DTV switchover?

Institutional Framework

- How can we organize a cooperative structure for DTV Switchover?
- How can we utilize existing related parties and newly established entities?

Budget and Financing

- How can we estimate the budget for the whole process?
- How can we raise funds?

Supply Side Dynamics

- How can we rearrange production and transmitting facilities?
- How can we support broadcasters?

Demand Side Dynamics

- How can we develop a support system to protect viewers?
- How can we raise public awareness?
- How can we supply digital broadcasting receivers?
- How can we improve reception conditions?

Pilot Projects

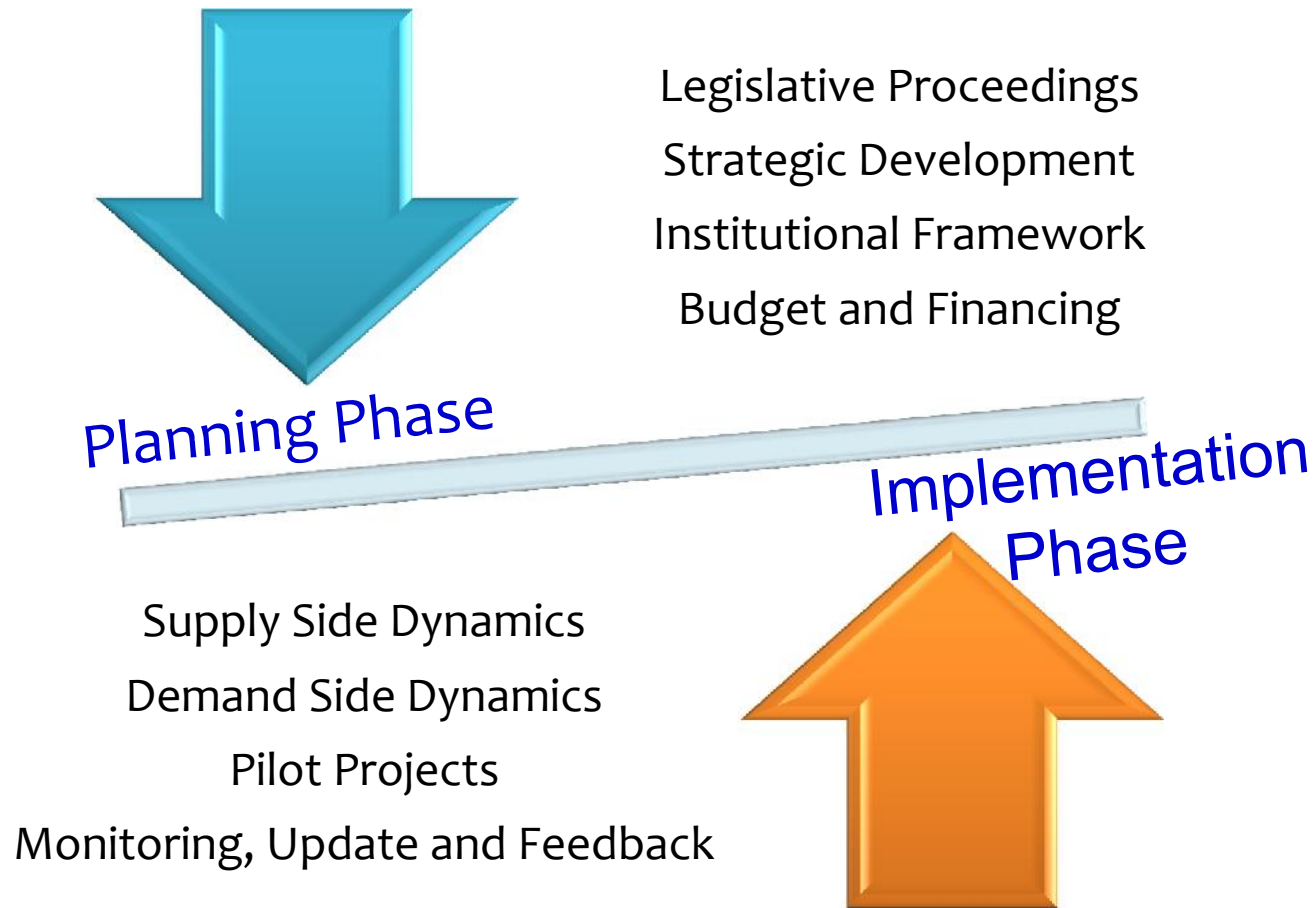
- Why are pilot projects required ahead of the actual trial?

Monitoring, Update and Feedback

- How can we check that DTV switchover is proceedings as well as planned or if there needs to make updates or revise the plan?

Solution to smooth DTV Switchover

- After due consideration, the solution to smooth DTV Switchover divided into two phases ; **Planning** and **Implementation**



■ What is legislative environment for DTV Switchover?

- The issues and solutions discussed above were developed and put in a legislative form to provide a legal authority with which to facilitate easier progress in the switchover process through compulsory and supportive measures for each party.
- Therefore, the Korean government enacted the DTV Special Act on the Digitization of Terrestrial Television Broadcasting and the Activation of Digital Broadcasting in March 2008 (hereinafter referred to as the ‘DTV Special Act’).
- The DTV Special Act is believed to be one of the most suitable legislative actions for the implementation of DTV.

■ What contents should be in legislation for DTV switchover?

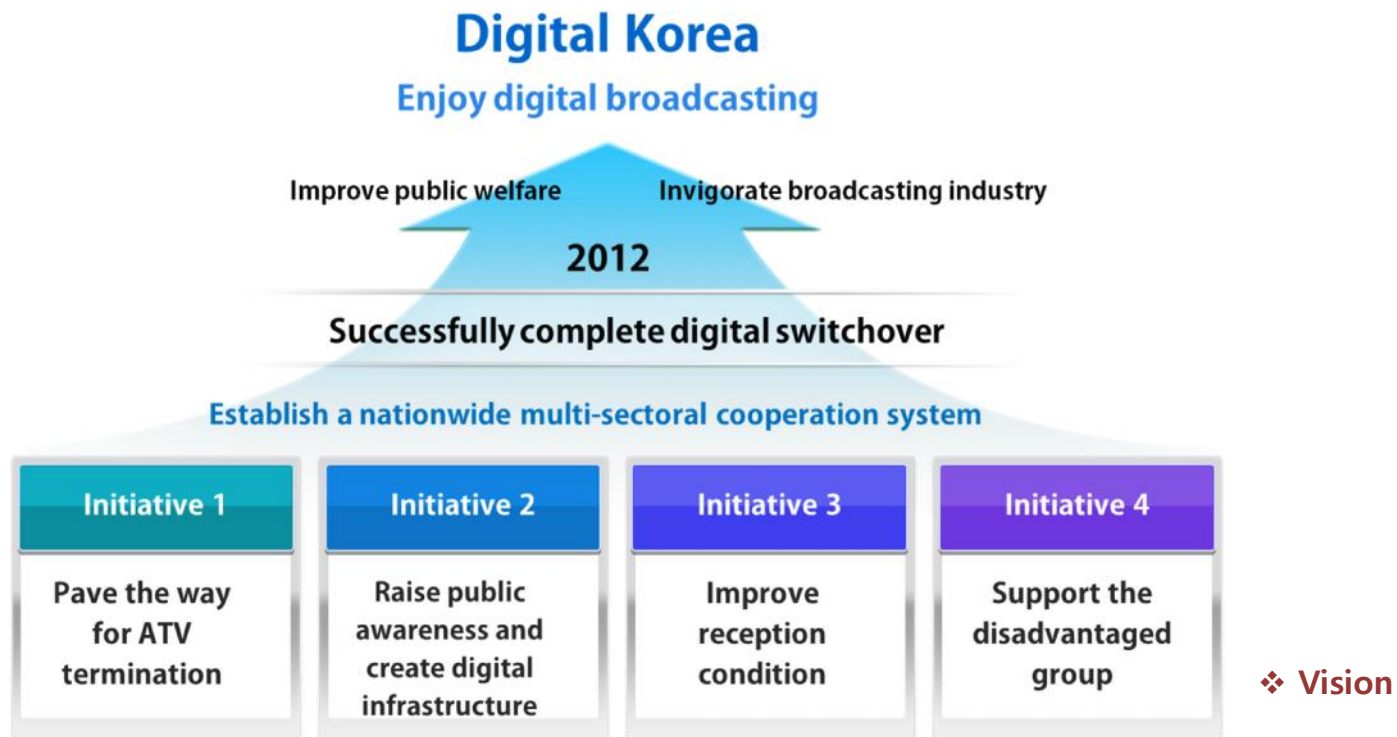
- DTV Special Act contains provision on ; strategic planning, dedicated organizations, ATV termination date, mandatory embedment of digital tuner, aid scheme, obligation of broadcasters.

❖ Contents of the DTV Special ACT

Article	Contents
1 & 2	Purpose and Definition
3	Establish a DTV Switchover Roadmap and DTV Switchover Promotion Plan
4	Organize and Manage DTV Switchover Steering Committee
5	HD Digital Broadcasting Programming Embed a terrestrial digital tuner
6	inside
7	Embed a terrestrial digital tuner inside
8	Terminate ATV
9	Instruction and Advertisement of TV set and related electronics
10	Support to the economically disadvantaged
11	Measures to complete DTV switchover
12	Support to the terrestrial broadcasting companies
13	Support to install broadcasting auxiliary stations
14	Enhance DTV reception condition
15	Survey on reception condition
16 & 17	Submission of materials
Supplementary Provision	Correction order and Penalty Enforcement date and Term of validity

■ What is the rationale for setting up a strategy development framework?

- It is imperative to establish organized and firm but flexible strategies to resolve the challenges and difficulties outlined above.
- The Korean government managed and how the strategies were developed step-by-step. Particularly, this strategic development is focused on the transition period from 2008 when DTV switchover proceeded in earnest nationwide with the enactment of the DTV Special Act of 2008 and the DTV Switchover Roadmap of 2009.



Solution to smooth DTV Switchover – Planning Phase

■ How can we make steady progress and proceed with DTV Switchover?

- The DTV switchover strategy was declared in the form of the DTV Switchover Roadmap in June 2009 which announced the final vision, detailed roadmap for the next 5 years, initiatives, and study assignments to complete DTV switchover.
- The Roadmap was incorporated into practical action plans every year, which generated the DTV Switchover Action Plans of 2010, 2011 and 2012.

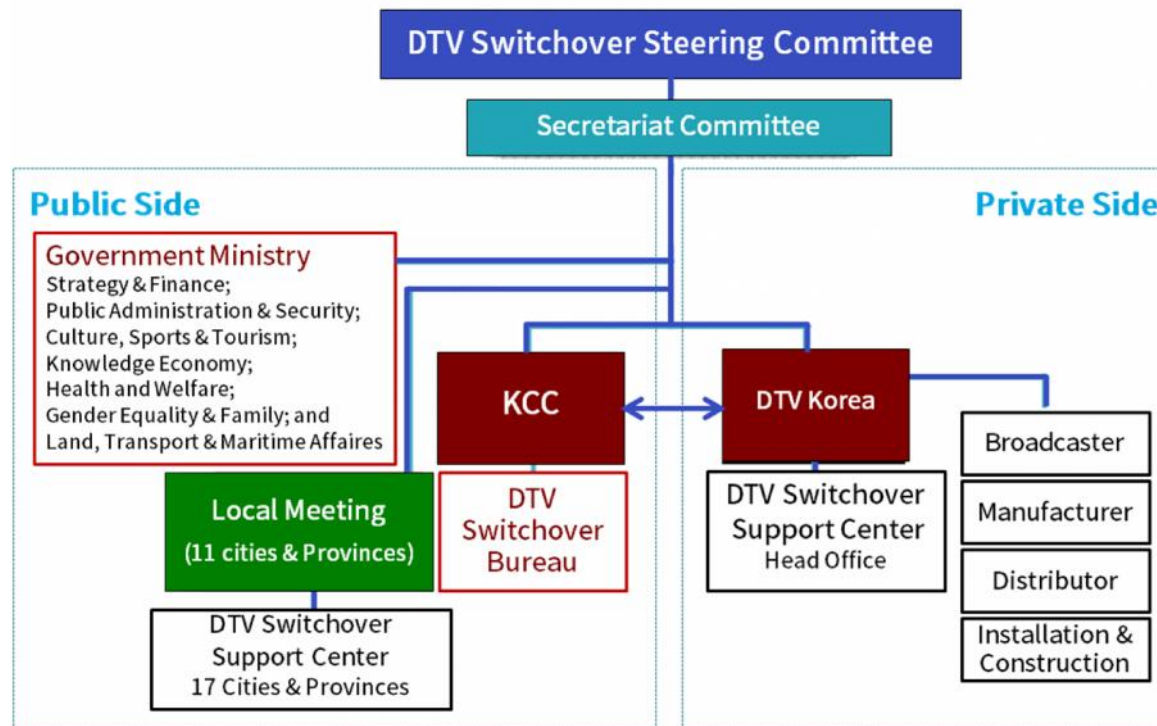
	Raising Public Awareness	Pilot Projects	Implementation and Checkup		Follow Up Measures
	2009	2010	2011	2012	2013
❶ Pave the way for ATV termination	Investment planning	Promote digitization of producing facilities and broadcast auxiliary stations			Check up
	Pilot project planning	Promote pilot projects			
❷ Raise public awareness and create digital infrastructure	Publicity activities using TV and newspaper; Viewer support system formation and operation		Publicize individually; Expand to nationwide	Advertising subtitle and visiting consultation	Viewer support continuance
		Publicity in pilot area and viewer support			
❸ Improve reception condition	Check up and prepare follow up measures	Implement reception condition improvement		Check up	Supplement unsatisfied
		Reception condition improvement in pilot area			
❹ Support the disadvantaged group	Preparation for support plan and revision of enforcement decree	Budget expansion and promotion scheme establishment	Promote support for low-income		Check up
		Support for pilot area			

❖ Roadmap

Solution to smooth DTV Switchover – Planning Phase

■ How can we organize a cooperative structure for DTV Switchover?

- It is necessary to establish a dedicated organization to play the key role in managing the digital switchover work, covering the full spectrum of related parties including local governments, broadcasters, manufacturers, and academia.
- The organizational structure and cooperative system established by the Korean government which provides an excellent example of this form of organization.
- The main highlight is the PPP (public private partnership) incorporated into the DTV Switchover Steering Committee.



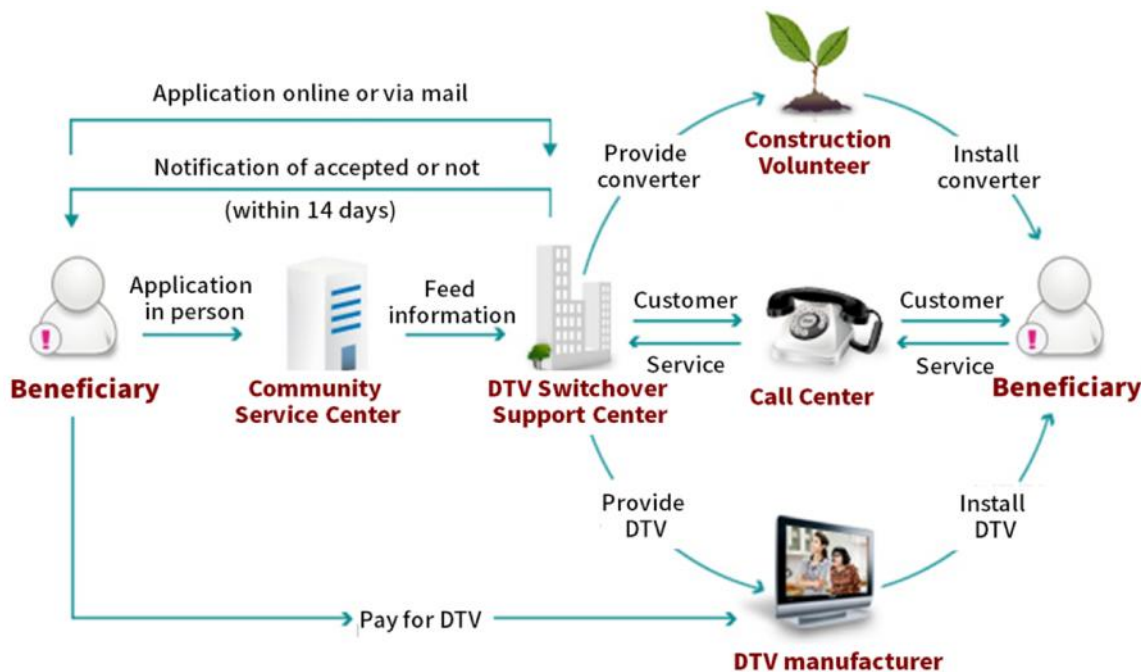
❖ **Cooperative System led by DTV Switchover Steering Committee of 2009**

Solution to smooth DTV Switchover – Planning Phase

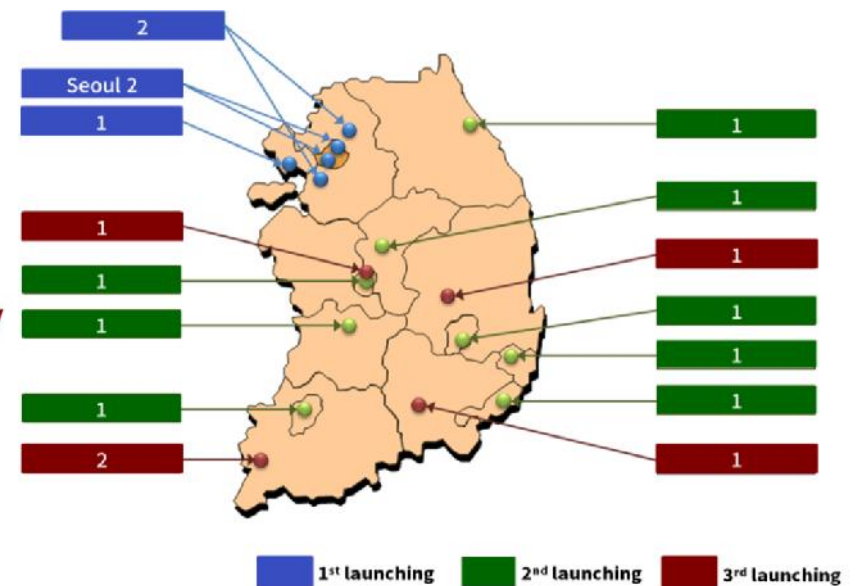
How can we utilize existing related parties and newly established entities?

- **DTV Korea** : Performed DTV switchover publicity activities and operated a DTV call center
- **DTV Switchover Support Center** : 7 Centers were established all over the country

Work process of Support Center and Call Center



Deployment of DTV Switchover Support Center



■ How can we estimate the budget for the whole process?

- The budget was estimated based on the entire process of DTV switchover from planning to implementation which all generate financial costs.
- In the case of Korea, The total budget required for the entire DTV switchover process was estimated at \$2.8 billion for the five years from 2009 to 2013

Purpose	Budget Items	unit:\$M
Pave the way for ATV termination	Digital programming facilities and digital contents	1,375.9
	Loan	89.5
	Pilot projects	3.5
PR and support viewers	Raise public awareness	84.6
	Support viewers	112.0
Improve DTV reception condition	Survey on reception conditions	4.4
	Resolve the fringe area	136.5
	Improve Reception facilities	44.2
Support the economically disadvantaged class and vulnerable social group	Support the economically disadvantaged	82.5
	Provide reception supplementary equipment	18.0
	Prepare measure for the non-switched viewers	1.4
	Support broadcasting contents	586.7
	Research and Development	182.3
	HR training	25.4
	total	2,746.8

❖ 2009 – 2013
budget compilation
(unit: \$M)

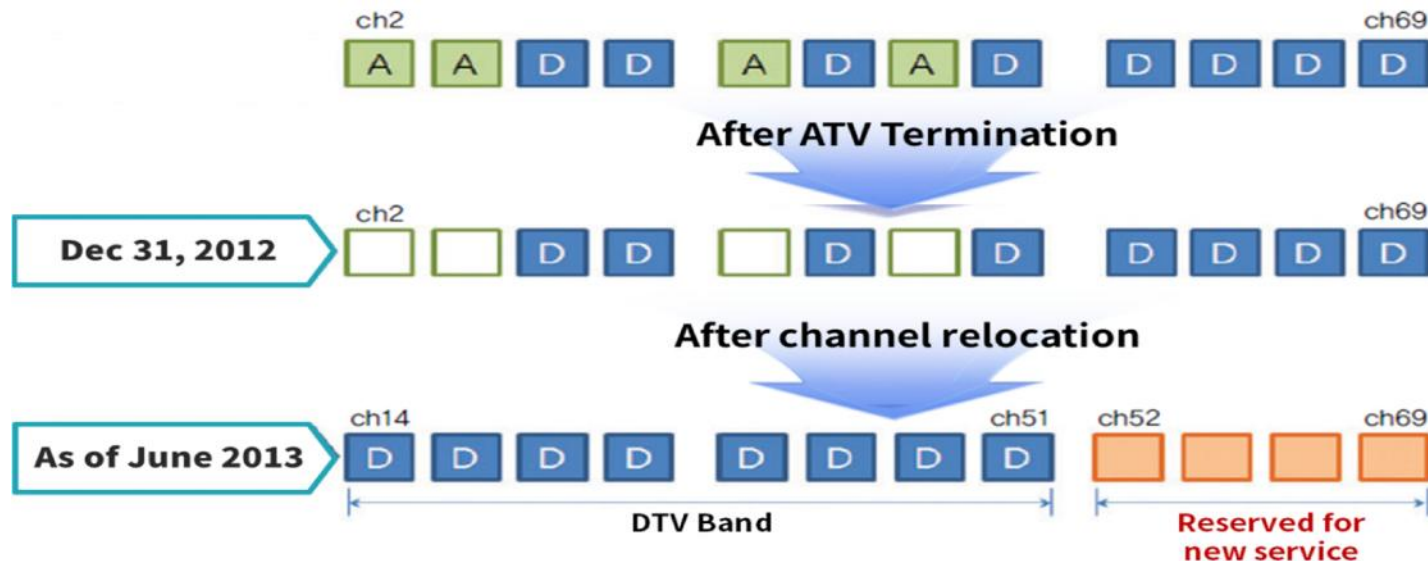
■ How can we raise funds?

- The usual manners of financing the switch to DTV : **Self-funding of broadcasting companies, Government aid Revenue from auctioning radio spectrum** (Digital Dividend), **License fee from viewers**
- In case of Korea, it was decided that principally broadcasting companies would raise the money for their required investment in digital conversion with the help of government policy measures such as expansion of loan, Increase of TV license fee, and Improvement of advertisement policy.
- The government funds were raised through the Broadcasting Development Fund in 2010, and then through the ‘Communications Development Fund’ raised through revenue from a spectrum auction in 2011.
- The consultation process led to the appraisal that TV manufacturers should raise funds to help the broadcasting companies construct digital infrastructure. -> However, this was not accepted because of the poor legal rationale for requiring manufacturers to contribute to a fund for government policy project.

■ How can we rearrange production and transmitting facilities?

- By changing analogue broadcasting system to Digital, general digital context can be produced in a 16:9 aspect ratio, high definition video format while audio is in stereo or the 5.1 channel, surround sound audio format
- The Digital switchover is not carried on at once. It is required to simulcast for the transition period and needs to have integrated transmission system that can transmit analog and digital signals simultaneously.
- In the Korean experience, CH 52-69 used for ATV/DTV simulcast was reserved for new service and the channels within CH 14~51 were also rearranged for efficient use of spectrum resources after analog switch-off

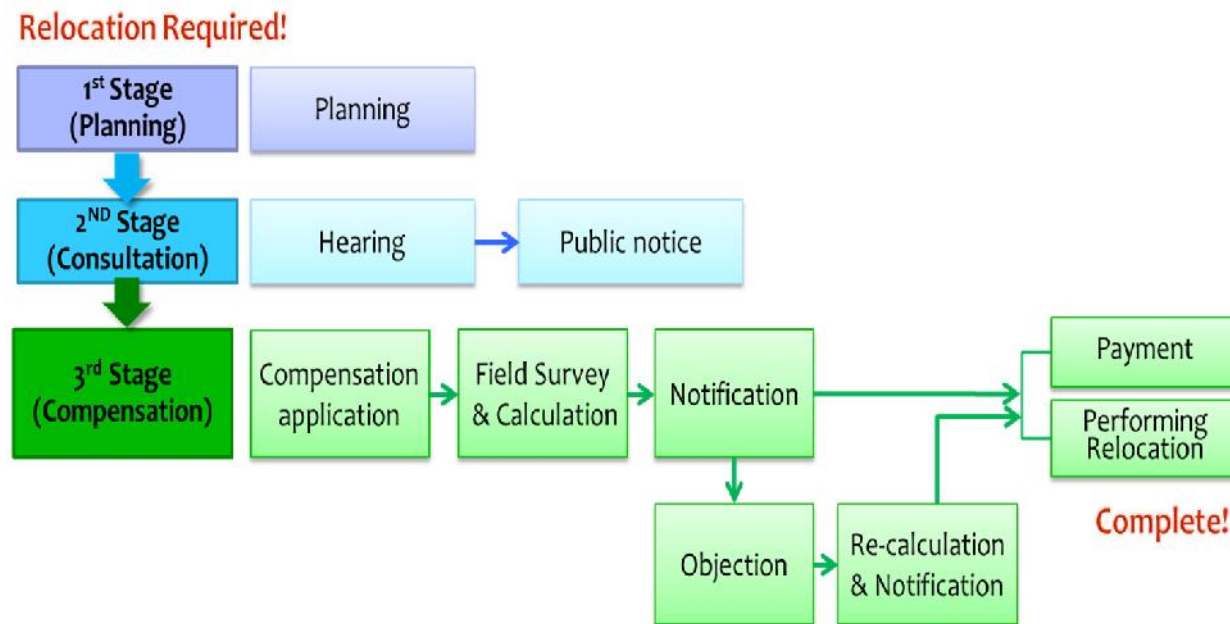
❖ DTV Channel relocation band plan



■ How can we support broadcasters?

- **Tariff Reduction** : From 2008, a total of thirty-six digital broadcasting facilities benefited from tariff reductions of 50% until the completion of the digital transition.
- **Loan Program** : The Korean government ran a loans program to support the broadcasters required to accept switchover costs and to promote development of digital broadcasting industries.
- **Financial Compensation** :Where radio frequency spectrum (channels) were reassign as a part of the transition to digital, some broadcasters were eligible to receive financial compensation where a loss was incurred as a result of the change to digital.

❖ Compensation in relocation process

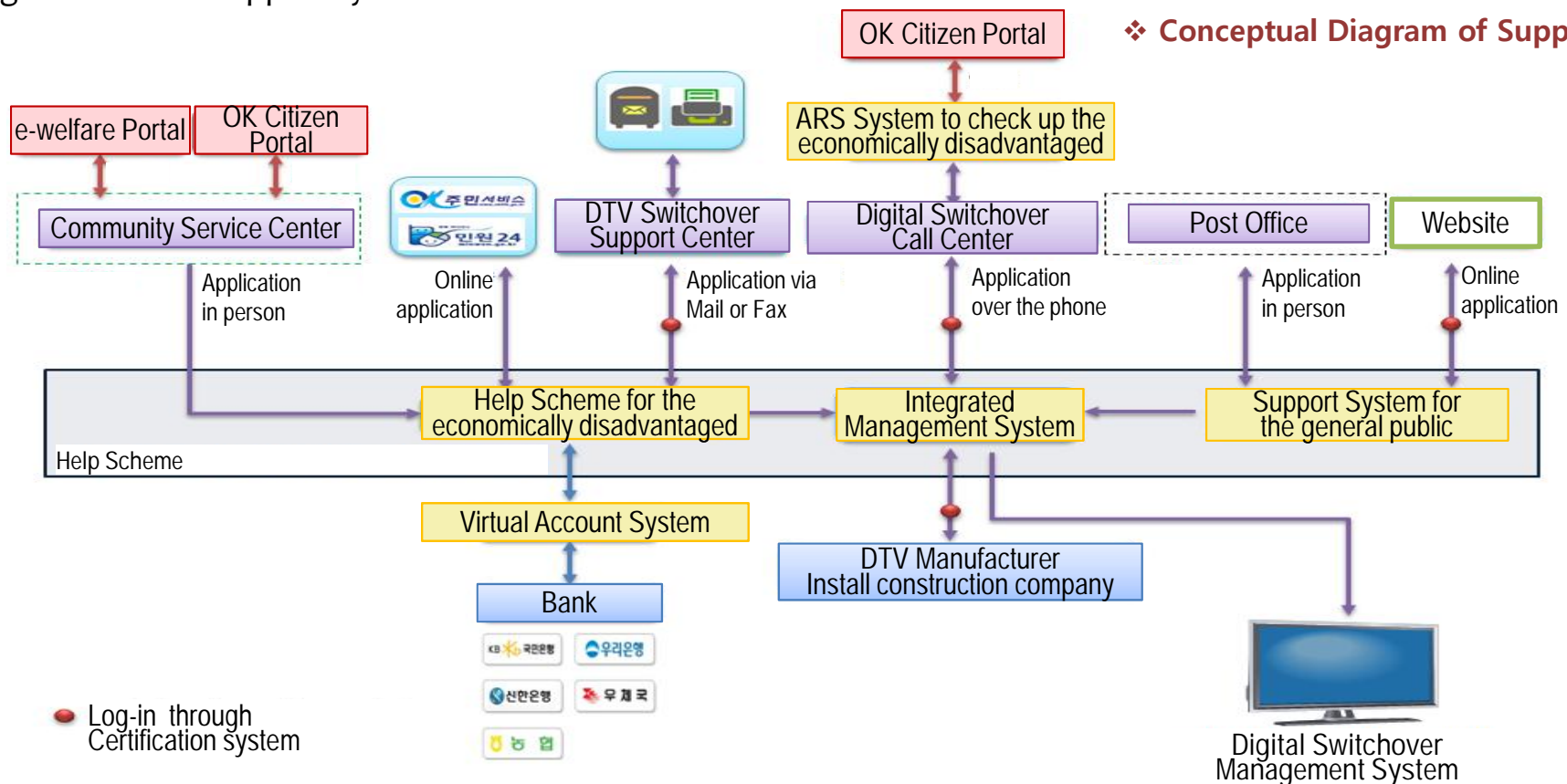


Solution to smooth DTV Switchover – Implementation Phase

■ How can we develop a support system to protect viewers?

- The Korean government developed an interconnected online and offline support system to help disadvantaged groups and promote digital switchover.
- Web-based support system was easily accessed and used by the disadvantaged as well as general households
- Off-line public places such as post offices and community centers were used to provide access points to the governmental support system.

❖ Conceptual Diagram of Support System



■ How can we develop a support system to protect viewers?

- KCC then provided training to community center officials about DTV switchover. Community center officials were trained on government support content; such as how to receive applications and use the governmental support system in order to support vulnerable social groups.
- Additionally, the authorities chose local construction companies to provide complete solutions to support the installation of digital converter and antenna hardware.

❖ Support and Promotion System



Solution to smooth DTV Switchover – Implementation Phase

How can we raise public awareness?

- Public promotion were TV/Radio advertising, public campaigns, and internet advertising on popular portal sites and online newspapers.
- Targeted publicity included warning captions on broadcasts, door-to-door promotions, and public publicity events and distributing promotion materials.



자세히 보시고 널리 알려주세요! 

지상파 디지털 전환 정부지원을 확대 실시합니다!

유료방송 가입이나 디지털 TV 보유와 관계없이 아날로그 TV와 안테나로 아날로그 TV 방송을 시청하고 계시다면 정부지원 대상입니다.

우리 집이 정부지원 대상인지 간단하게 확인하는 방법!

아날로그 TV 화면에 다음과 같이 자막이 나오면 정부지원 대상입니다. 지금 바로 신청하세요.

디지털 전환 정부지원 신청	
저소득층	일반가구
전화	124(무료)
방문	주민센터 우체국
인터넷	민원24 (www.minwon.go.kr) OK주민서비스 (www.oklife.go.kr)

디지털 전환 홍보대사
이은서 황수경



지상파 아날로그 TV방송 지역별 종료일

동절기인 연말에 정부지원 신청이 집중되어 국민들에게 불편이 발생하지 않도록 지역별로 순차 종료합니다.

울산(종료)	충북	경남	부산	대전·세종·충남
8월 16일 14시	9월 24일 14시	10월 4일 14시	10월 9일 14시	10월 16일 14시
전북	강원	광주·전남	대구·경북	수도권
10월 23일 14시	10월 25일 14시	10월 30일 14시	11월 6일 14시	12월 31일 04시

문의: 국민없이 124(무료) | 홈페이지: www.dtvkorea.org, www.digitaltv.or.kr



■ How can we supply digital broadcasting receivers?

- Different measures for distributing digital broadcasting receivers among the economically disadvantaged and the general public : **Designate digital broadcasting receiver**
- Government sought to induce the viewers to voluntarily participate in switchover by means of designating digital broadcasting receiver hardware units as meeting government quality standards such as entry-level DTV sets, etc

❖ entry-level DTV



Samsung 55cm(22inch)
LCD TV
Disadvantaged Only



LG 58cm(23inch)
LED TV
Disadvantaged Only



Daewoo 81cm(32inch)
LED TV
Entry-level



U-Han Prezen 81cm(32inch)
LCD TV
Entry-level

❖ DtoA Converter



❖ Antenna



Maxwave indoor antenna



Maxwave outdoor antenna

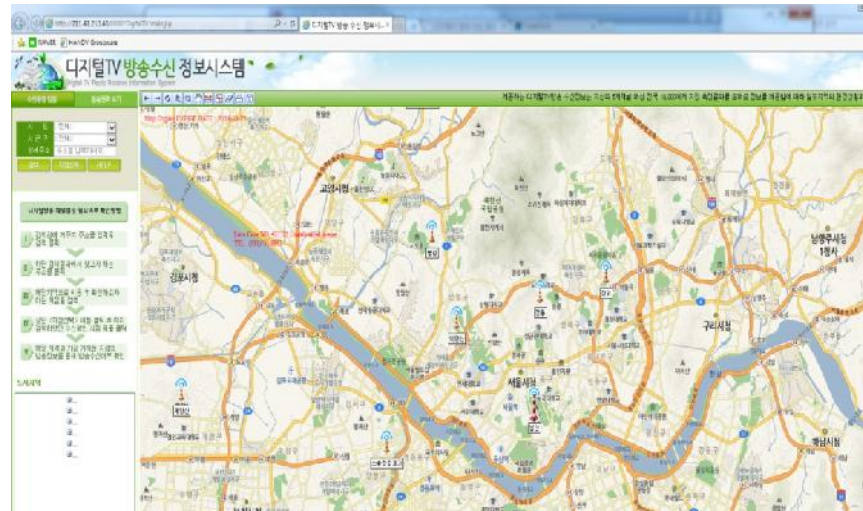


Spectrum indoor/outdoor antenna

■ How can we supply digital broadcasting receivers?

- Launch a comprehensive one-stop website for digital broadcasting receiver information and online purchase www.digitaltv.or.kr
- Expand the Offline Sales Network

❖ Digital receiver website (www.digitaltv.or.kr)

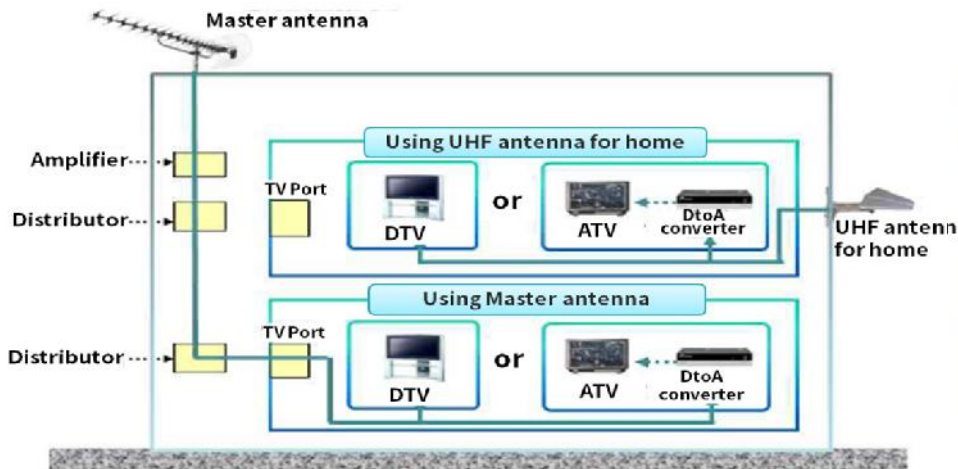


- Quality control, product support, providing an assortment of entry-level DTV sets to give viewers choice

■ How can we improve reception conditions?

- To directly receive digital broadcasting signal, detached housing needs and UHF indoor/outdoor antenna and apartment complex housing should be equipped with a MATV system
- The government concentrated on improving MATV facilities in consideration for peculiarities of the Korean context where apartment housing is dominant.

❖ Direct Reception in Apartment Housing



❖ MATV in apartment complex

Apartment Housing MATV



Headend System



master antenna

■ Why are pilot projects required ahead of the actual trial?

- The basic purpose of the pilot project is to perform the various activities which are expected to be needed during the actual DTV switchover process in advance to evaluate the process and results.

❖ Selection Criteria for pilot areas

1. Where it has more than 3 available broadcasting channels to enable many broadcaster participate in
2. Where has less interference of analog signal from the neighboring areas
3. Excepting where has full-power stations, regarding the attribute of pilot project

❖ Selected Areas

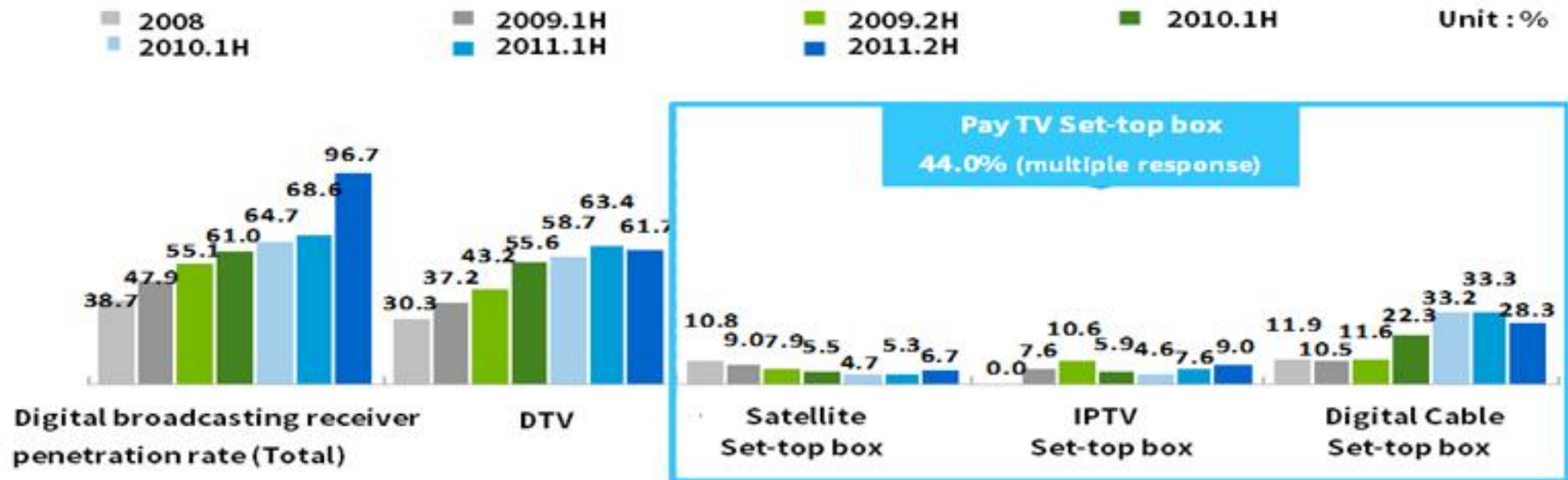
Candidates	Danyang-gun	Uljin-gun	Gangjin-jun	Jeju-do
Number of Households	14,524	23,109	18,369	216,005
Characteristic of Area	Basin	Coast	Plain	Island
Number of Pay TV Households	11,730	16,837	14,102	172,221

Solution to smooth DTV Switchover – Implementation Phase

■ How can we check that DTV switchover is proceeding as well as planned or if there needs to make updates or revise the plan?

- As part of the DTV switchover process, base line data is needed to assess the need for governmental support and consequently prepare an effective support plan.
- The Korean government conducted continually surveys on ATV termination awareness rate, DTV switchover awareness rate, TV viewing in island areas and low-income households, e.g.

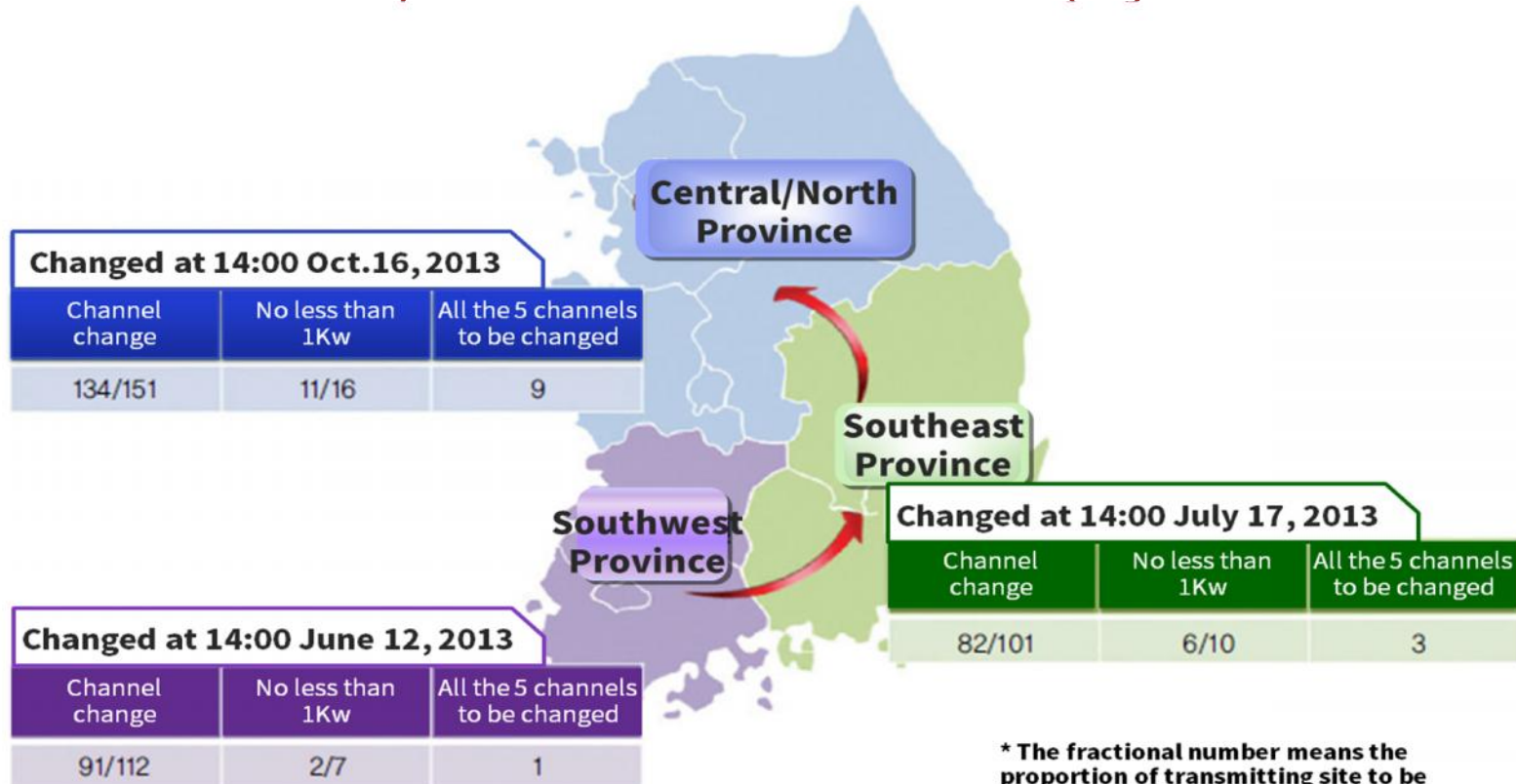
❖ DTV Switchover awareness rate by year



■ Successively Analogue TV switch-off and Sequential DTV transition

- Analogue TV successively shut down at 2012.12.31. and DTV channel confirmed sequentially at each planned time.
- Recent DTV penetration rate is over 95% overall provinces and still endeavored to increase the rate such as improving TV receiving system for apartment complexes etc.

❖ Consequent relocation and transmission stations by region



* The fractional number means the proportion of transmitting site to be changed among the all stations