



Spectrum Resource Utilization in the IT Innovation Era

2001 International Symposium on
Signals, Systems, and Electronics (ISSSE '01)

Focused session: WE1-B

"Spectrum Resource Management and Radio System Technology"

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I. A policy proposal for improving the administration of radio spectrum resources in Japan (headers only)

- A. Introduce competition to the allocation of spectrum resources by means of auction.
- B. Promote relocation of incumbents.
- C. Disclose all information on the use of spectrum.

II. Advantages and disadvantages of competitive allocation (auction) of spectrum resources

A. Advantages: auction

1. promotes efficient use of spectrum resources,
2. encourages new entries,
3. achieves level-fielded competition by users,

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4. prevents unjustifiable transfer of wealth and corruption,
 5. increases in the transparency of use and regulation of spectrum resources, and
 6. the government obtains additional income.

B. Disadvantages: auction

1. possibly creates private ownership of spectrum resources (as in U. S.),
2. possibly increases the supply price of services that use spectrum,
3. possibly induces unreasonably high bid of spectrum resources (as in U. K., Germany), and
4. incurs the administration cost of auction.

III. Efficient use of spectrum resources—A proposal of “ Modified Lease Auction ”

A. Simple lease auction (LA):

1. Auction of spectrum licenses conducted not only at the time of initial issuance of licenses but also at the time of renewals

2. Benefits of LA as compared with conventional (non-lease) auction (stock auction):

- Can keep flexibility of allocation of spectrum and relocation of users
- Can lower bid prices
- Can decrease uncertainty to bidders

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- Can maintain more equal treatment of newcomers and incumbents
 - Can migrate more easily to “open access”

3. Shortcomings of LA:

- Risk arising from possible discontinuation of the use of spectrum
(which discourages fixed investment for using spectrum)
- by losing LA for the next-period use of the spectrum
- by termination of spectrum allocation (reallocation for another use) by the government

B. “ Modified lease auction (MLA) ”:

1. Timing of auction:

- Conduct auction several years ahead of the start of using the spectrum
- Incumbents who have lost auction for continued use of the spectrum can have extra time to prepare for closing business, selling off, etc.

2. Auction price:

-Give discounts on auction payments by incumbents (the government determines discount rates)

3. Insurance against termination of allocation

(when the government terminates the current allocation of the spectrum and initiates another allocation)

-Insurance premium to be designated by spectrum users

-Rate for insurance fee to be determined by the government

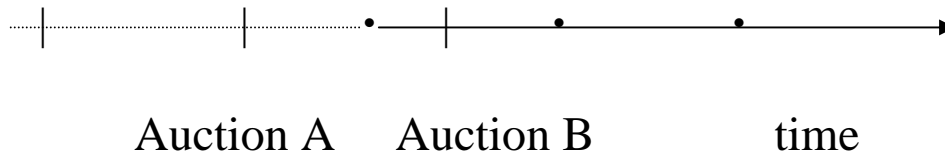
4. Parameters to be determined by the government for MLA:

- Length of the license period
- Lead time of auction
- Rate of discount to be granted to incumbents on auction payments
- Rate for the insurance fee

5. Timing of MLA:

Announcement

of the Parameters Lease A Lease B



C. Comparison of alternative modes of competitive spectrum allocation

1. Open access (time- and spectrum sharing):

a. A. Toffler:

- Analogy to ocean space and cruising vessels
- Use self control and mutual coordination to avoid collision;
centralized control not needed
- May become possible by the development of software-radio
technology

b. E. Noam:

- Analogy to toll-way traffic with variable tolls depending on the degree of congestion
- Use of “instantaneous auctions” to allocate spectrum in real time by computers; efficiency guaranteed
- Software-radio technology will help, but some control is needed to manage the auction and payments

c. Regional wireless LAN:

- Analogy to freeway traffic without tolls
- Efficient use of spectrum is not guaranteed; congestion may arise

2. Restricted use:

a. Lease auction (LA, MLA)

- Analogy to land lease for residential houses or office buildings
(except for the length of lease period)
- Need for government control
- Efficient use of spectrum is guaranteed up to the level
determined by the length of lease period and by “modifications”

b. “Stock” auction (auction used in U.S. and in European countries)

- -Analogy to selling land segments
- -Same as LA with a lease period extended indefinitely to the future
- -Government control is kept minimum, needed only at the time of (once-and-for-all) auction for initial license

3. Summary

- a. Tradeoff between the efficiency of spectrum use for the society and uncertainty to spectrum users
- b. Technological progress changes the basic conditions for spectrum use, making it more efficient to rely on open-access use