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*THE NEW PARADIGM FOR 21<sup>ST</sup> CENTURY AVIATION*

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## **Primer**

# **The V1 Concept of Air Transportation Management**

## **Commoditizing Runway and Airspace Capacity: Completing the Deregulation of Air Transportation**

**Edition 1.1**

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The materials contained within this document are the subject of one or more pending U.S. patent applications.

## Primer

### The V1 Concept of Air Transportation Management

Velocity 1 LLC is an aviation economics research and advocacy enterprise engaged in developing an innovative concept in air transportation management.

The concept proposes a free-market framework which embraces basic economic principles throughout the *entirety* of the air transportation infrastructure. The purpose of this structure is to eliminate the economic drain on nation-wide productivity, which is caused by air transportation delays. It is intended that the proposed structure would allow the entire industry to meet its potential as a critical enabler of economic development, providing for the expansion of GDP.

#### Background

In 1978, the Airline Deregulation Act (the Act) made air carriers accountable to the free market. In effect, the Act turned granular units of seat and freight capacity onboard commercial aircraft into transiently consumed, tradable and recyclable commodities. However, *V1* proposes that commercial seat and freight capacity is only *one of three* elements responsible for generating economically efficient air transportation throughput. The Act left the other two elements, which we define as *runway environment capacity* and *safe-separation airspace capacity*, to be centrally controlled (rationed) through Federal Aviation Regulations. This inadvertently put in place a flawed market structure, inducing the free-market overconsumption of resources which, in turn, have remained federally rationed. By its very design, this structure has prevented these centrally controlled resources from keeping pace with the market. We propose this inadvertent but critical lapse in the Airline Deregulation Act has been the primary cause behind chronic air transportation inefficiency, and the GDP-robbing loss of national economic productivity which has resulted.

*V1* proposes that modern technology now makes it possible to remedy this lapse while continuing to ensure the safe integrity of air transportation. Our research proposal, *The V1 Concept of Air Transportation Management*, describes a free-market framework and builds an accompanying economic model intended to augment the Next Generation Air Transportation System. The concept identifies the 3-dimensional volume of space, which is framed by a single seat or a single unit of freight volume onboard a commercial aircraft, as one granular unit of space which is virtually tangible and tradable as a commodity. The concept then transfers this principle to the 3-dimensional volume of navigable airspace. In this manner, granular units of digitally-framed airspace would *also* be defined as virtually tangible and tradable commodities. This allows airspace to cease being viewed as a nebulous void, inefficiently influenced by centrally controlled air navigation services.

VI perceives this concept as a vast opportunity for creating an economically sound and operationally efficient air transportation infrastructure. In addition, the creation of a new commodity market could have a pronounced impact on U.S. GDP. The proposal is being presented to the FAA and members of the legislative branch in preparation of application for federal research funds.

### **Recognizing safe-separation airspace as a *virtually* tangible and tradable commodity**

Place yourself in the wide open American west in the late 18<sup>th</sup> century. At that time, the vast and open natural resource of two-dimensional land area was being ‘transiently’ consumed (occupied) by humans, for the simple purpose of sustenance. Throughout the 19<sup>th</sup> century, much of this land area ceased being ‘transiently’ consumed, as demand for consumption grew. Accordingly, land area became ‘permanently’ consumed (occupied), in granular units of acres or parcels, through private and commercial ‘ownership’, in a free market system of legal trade.

We can compare the market-based transition of the consumption of 2D land space, illustrated above, to the current method of consumption of 3D airspace. Today, the open natural resource of airspace is transiently consumed by aircraft for the purpose of extracting the utility of lift as well as the utility of centrally controlled safe-separation services. However, whereas the transient consumption of 2D land area transitioned into long-term ownership in a market-based system of legal trade, the consumption of 3D airspace has remained federally rationed through Federal Aviation Regulations (F.A.R.’s). We see this as the primary cause of air transportation inefficiency.

As a solution which will allow air transportation to meet its potential as a critical enabler of economic development, we will propose that airspace cease being federally rationed through the air traffic control organization of the FAA. As an alternative, *The VI Concept of Air Transportation Management* constructs a holistic system of air transportation management based on the economic laws of supply and demand. This system would digitally define granular units of airspace using technology already being developed for The Next Generation Air Transportation System (NextGen). The concept proposes that these units of airspace could be provided by privatized utilities, and traded and consumed in a free market. This would allow the FAA to focus on safety oversight, much like the Nuclear Regulatory Commission functions within the electrical power industry,

### **Identifying two constraints on the consumption of volumetric space**

Leaving the late 18<sup>th</sup> century American west behind, let’s move forward 225 years to the current era. Picture the cities of Phoenix and Las Vegas today. Each urban center seems unbounded by two-dimensional land area. Land continues to be consumed by permanent ‘owners’ of real estate as the boundaries of each city continue to expand outward into the seemingly endless desert. But in this expanding consumption of space through the ownership of land area, there lie two categories of constraints. First, we know that the seemingly unending environment surrounding each city does not go on without physical bounds. So, there is the *outward* physical constraint against consumption. Second, we

know that each additional unit of land area which is consumed within existing boundaries imparts an increasingly greater strain on the natural ability of all resources within those boundaries to support this consumption. So, there is the *inward* physical constraint against consumption.

Addressing the category of *outward* constraints, let's consider easily recognizable natural constraints against the consumption of land area in New York City, where the five boroughs are bordered by several bodies of water. The constraints imposed by these natural boundaries cause certain economic behaviors in the ongoing consumption of land area. In particular, with almost all natural land space consumed on the island of Manhattan (occupied through 'ownership'), two behaviors can be easily noted:

- Price governs the consumption (exchange) of granular units of land area in this physically closed environment.
- With two-dimensional land area on the island exhausted, more space has been *fabricated* in the vertical dimension (3D) through high rise structures and subterranean development.

We can use these two phenomena to illustrate the consumption of airspace by the air transportation industry.

- The finite quantity of natural land space on Manhattan demonstrates the finite quantity of natural atmospheric airspace.
- The fabrication of surface traffic conduits on Manhattan is a *subset* of land space consumption intended for the safe channeling of vehicular traffic. This demonstrates the fabrication of all types of safe-separation airspace as a *subset* of natural atmospheric airspace.
- The fabrication of vertical space on Manhattan demonstrates the *inverse* of this capability with airspace. Whereas human consumption (occupation) of a particular unit of land space can be increased through the fabrication of tall buildings as a surrogate for more land area, the consumption of airspace cannot be increased through the fabrication of more atmospheric volume. It can only be increased through greater sub-division of safe-separation airspace as a subset of natural atmospheric airspace.
- The limited sub-division of 2D land space on Manhattan into functionally consumable units demonstrates the limited sub-division of 3D airspace as a function of safety limitations (risk tolerance).
- The economic governance of land space consumption on Manhattan, through the mechanism of price, stands in stark contrast to the utter lack of this mechanism in the consumption of safe-separation airspace. (Imagine if the federal government rationed developed land space on Manhattan in the same manner it continues to ration fabricated safe-separation airspace over the United States. It seems quite safe to say that Manhattan would not have developed into the premier generator of market value that it is today with the economic dysfunction that most certainly would occur.)

Moving on to the category of *inward* constraints, consider the Los Angeles basin today. The natural capacity of the air mass within the basin is unable to support any further impact from human development in the form of CO<sub>2</sub> emissions (smog). And of course, it is quite easy to consider constraints against water consumption in major desert urban centers such as Phoenix and Las Vegas. We can draw parallel examples of inward constraints to commercial aviation in the form of noise saturation, public perception of engine CO<sub>2</sub> emissions, runway consumption of municipal land space, and the inward limitations to the sub-division of safe-separation airspace itself.

Summarizing everything to this point:

- The 2D area of land space was once *transiently* consumed through occupation of space. This consumption transitioned to free-market trade, and became governed by price.
- The 3D volume of airspace is transiently consumed as a requirement for the generation of lift by fixed-wing transports, but this transient consumption continues to be rationed through federal regulations despite high demand for its utility.
- The tangible entity of land area allows us to easily visualize naturally occurring 2D area, along with its outward and inward constraints against over-consumption.
- Skyscrapers and subway tunnels in New York City allow us to easily visualize the sub-dividing of *fabricated* 3D volume as a remedy for overcoming natural outward constraints.
- Smog in the Los Angeles basin and water restrictions in desert cities make clear the consequences of over-consumption of natural inward constraints.

**Re-visiting safe-separation airspace as a *virtually* tangible and tradable commodity.**

Transitioning now to air transportation; consider the three-dimensional volume of passenger space which is fabricated (framed) by a seat on an airliner. Also consider how the three-dimensional volume of freight space is fabricated by that airliner's freight compartment. For the past 30 years, since the implementation of the Airline Deregulation Act in 1978, both of these standardized units of 3D volume have been available in a free market environment and subjected to the economic laws of supply and demand. Accordingly, their market clearing prices have been determined by the cost structures of their providing enterprises as well as the culmination of prevailing market forces. *VI* has built an economic model which proposes doing the same thing with navigable airspace volume. The model is presented in our main research proposal, *The VI Concept of Air Transportation Management*. It is based on the following assertions:

- There are three determinants of air transportation throughput:
  - 1 Air carrier seat and freight capacity
  - 2 Runway environment capacity
  - 3 Safe-separation airspace capacity

- The Airline Deregulation Act of 1978 was only a partial measure for the deregulation of the air transportation industry because it deregulated only one determinant of throughput; air carrier seat and freight capacity.
- The other two determinants, runway environment capacity and safe-separation airspace capacity, continue to be centrally controlled (rationed) through F.A.R.'s. This inefficient government structure requires the long-term, centrally planned, prediction and preparation of future navigational service requirements. Therefore, this structure mutually excludes the accommodation of the market (i.e. granular human choice) in *choosing* the future of air transportation infrastructure at the critical margin of occurrence between 'now' and 'next'.
- *The V1 Concept of Air Transportation Management* proposes that runway environment capacity and safe-separation airspace capacity be *digitally* defined as granular units of three-dimensional volume, and made available to the free-market by public utilities. This concept is analogous to how seat and freight capacity is *physically* defined in granular units of three-dimensional volume, and made available to the free-market by commercial enterprises.
- Each of the three determinants of air transportation throughput is *economically independent* of the others. However, all three determinants are *functionally interdependent* for the purpose of generating throughput.
- As proposed, each of the three determinants is a commodity. As such, all three share the same five attributes. These are:
  - 1 (Virtually) tangible
  - 2 Transiently consumable (through occupation of space)
  - 3 Divisible into granular units
  - 4 Tradable in a free market
  - 5 Recyclable for rapid and sequential consumption
- Development of 'NextGen' is necessary. But in its current state of conception, NextGen is flawed by three tacitly over-riding conventions. These are:
  - 1 A centrally planned and funded increase in the supply of safe-separation airspace capacity is the sole solution to air transportation congestion.
  - 2 NextGen contains no provision for the governance of demand, through the mechanism of price; for preventing the re-occurrence of air transportation congestion.
  - 3 NextGen contains no provision for the creation of market premiums as a self-generating source for economically efficient funding.

**VI proposes a self-sustaining, free-market solution**

As a solution to the centralized control of runway environment capacity and safe-separation airspace capacity, *The VI Concept of Air Transportation Management* builds an economic model based on the outright commoditization of runway and airspace capacity. The intent of this model is to accommodate human choice, at the critical margin of occurrence between ‘now’ and ‘next’. This would facilitate the free-market creation of a national air transportation system through the application of sound economic principles.

Our research proposal, defines the three-dimensional volume of digitally fabricated safe-separation airspace (SSA) and runway environment airspace (REA), as *virtually* tangible, three-dimensional real estate. This ‘real-estate’ must be consumed within the two categories of natural constraints, illustrated above, in order to avoid the consequences of congestion which occurs through over-consumption. Like 18<sup>th</sup> century land area, this ‘real-estate’ would be transiently consumed merely through occupation of its space. However, unlike 18<sup>th</sup> century land area, which was transiently consumed at no monetary cost, fabricated SSA and REA would be purchased and sold in a free-market environment, and would be instantly re-generated for sequential consumption (occupation). This would give these two types of virtual real estate the same free-market properties as virtually tangible seat space and freight space made available by the air transportation industry. And just as seat and freight space are fabricated commodities, which are transiently consumed in a free market, so to would SSA and REA be consumed. Accordingly, they would no longer be centrally controlled and rationed by the FAA. All three of these co-determinants of air transportation throughput (SSA, REA, and seat and freight capacity) would be accountable to the free-market. Just as in the saturated real estate market on Manhattan, price would determine the dynamic exchange of space.

To allow the functional establishment of this concept, air navigation and safe separation services would become ubiquitous utilities. These services would be provided by private commercial entities, much like electricity, radio frequency bandwidth, and GPS signals. Demand-induced congestion in air transportation (over-consumption of capacity) would be naturally governed by price. Supply of safe-separation airspace (both volume and throughput capability) would grow through market provided premiums for funding the implementation of capacity-enhancing technology. Financial support in the form of subsidies for under-utilized safe-separation airspace would become transparent and would be comparable to alternative market-based funding. Aviation safety would become the sole concern of the FAA, as it would be freed of its air traffic control duties. The air transportation system would be allowed to reach its potential as a critical enabler of economic growth. GDP would expand.



*The VI Concept of Air Transportation Management* is being circulated to individuals and institutions in industry, academe, the air transportation media, and the legislative branch. Through this effort, *VI* hopes to generate support for federally sponsored research for the purpose of investigating and validating this concept.

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