Between Telecommunication Efficiency and Instability: Towards an Historical Approach

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In the 1933 edition of the *Major Greek Encyclopaedia* the author of the entry "Telephone" noted:

> It is worth observing, that it is possible, through the use of repeater coils on two existing telephonic circuits, to superimpose a third circuit, so that all three can operate simultaneously and independently from each other. The attached illustration is a symbolic presentation of this. Non-real materially, the telephone circuit formed in this manner is called a *phantom* or *artificial*.[1]

Exemplars *par excellence* of efficiency for telecommunication circuitry, these circuits theoretically provided additional lines without having to pay firstly, to erect additional poles, and secondly, to draw additional wire over mountains and under seas. In the accompanying illustration proffered by the Greek Encyclopaedia, the phantom circuit afforded the addition of a gentlemanly communicating male coupler to the two male-female communicating couples serviced by the existing lines – upon the configuration of a phantom circuit (also called "derived," "plus," "superimposed," or "superposed" circuit), the existing lines were called "physical" (or "side") circuits. Absent from this 1933 symbolic representation of technical efficiency is any sketch of the social work required to make such efficiency real. In the technical vocabulary of the history of those working in order to produce "phantomed" telecommunication circuits that I introduce over the course of this paper, the name of what differentiated between abstract and concrete phantom circuit efficiency was lack of balance, in other words, "instability". In the terminology of economics, technical efficiency meant profitability. In the case of phantom circuits, the instability, which resulted from the failure to construct or maintain an adequate "balance" between the physical and the phantom circuit, was manifested usually as "cross-talk". For example, having been theorized as the ultimate in efficient telecommunication circuitry at the time, when tried in practice the first generation of the Bell Labs "carrier multiplexing" circuits was marked by the perpetuation of the instability issue (I define multiplexing in general and carrier multiplexing in particular later in this paper, which is were I move on to relate multiplexing to phantoming). We learn