

# On the Superdistribution of Digital Goods

(Invited Paper)

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**Abstract**—Business models involving buyers of digital goods in the distribution process are called superdistribution schemes. We review the state-of-the art of research and application of superdistribution and propose systematic approach to market mechanisms using super-distribution and technical system architectures supporting it. The limiting conditions on such markets are of economic, legal, technical, and psychological nature.

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## I. INTRODUCTION

Information systems in general and the distribution of digital content in particular are dominated by centralised structures rooted in client-server models, and large efforts have been made for the vertical integration of content production, ingestion, and distribution [1]. The final transportation of content to the head-ends is nowadays either digital broadcast, e.g., DVB [2], multicast, as for instance envisioned in 3GPP Long-Term Evolution [3], or content push [4].

Peer-to-peer (p2p) systems on the other hand realise a completely different paradigm for data transport in networks, namely distribution from nodes to other nodes with little involvement of central instances [5]. File-sharing networks like KaZaA or Gnutella embody this paradigm on the application level, implementing overlay networks in which users actively (with varied degrees of automation) re- or *superdistribute* content, in the form of digital files, to other users.

The term superdistribution may have been coined in [6], [7], in any case it has been around in information and communication research for some time. Though the concept lay dormant for quite a while — perhaps due to the association with the dominant use of p2p and file sharing by free riders and the copyright wars — interest in superdistribution has been rekindled recently in the content producing industry. The combined size of the most important existing businesses based on content superdistribution schemes are of a small scale in comparison to the turnovers of the media industry as a whole. Nevertheless they prove that the industry is seriously experimenting with the concept. Most importantly, superdistribution has even been cast in the form of a standard for the mobile domain by the Open Mobile Alliance (OMA).

Technically, superdistribution has hitherto been viewed just as a variant of Digital Rights Management (DRM) [8], [9],

or of p2p systems, and research on its fundamentals is still scarce. For instance, basic economic questions pertaining to the viability of superdistribution in particular in competition with free riders have only been examined in our previous work [10]. The present paper presents a first contribution to a treatment of other characteristic issues of superdistribution systems, viewed as information systems in their application and economic context. A system model for generic superdistribution is proposed in Section II, while Section III presents two concrete realisations with distinct traits. Section IV is the core part of the paper which collects the (in our view) most important research topics on superdistribution and tries to give an overview over the current state of knowledge in the area. The overarching theme here is the technological and economic viability of such systems. Section V tries to put superdistribution into the context of current socio-economic developments surrounding content distribution, copyright protection, and piracy, in front of their historic background. We conclude in Section VI.

## II. THE GENERAL STRUCTURE OF SUPERDISTRIBUTION NETWORKS

Superdistribution is the combined distribution and market scheme for digital goods involving buyers in the distribution process in such a way that they redistribute the good to other legitimate buyers. Here a *digital good* is an information good in the economical sense [11], [12], which is represented in digital form, regardless of being embodied physically or only in intangible form (some use the term *virtual goods*, coined by [13] and used for information goods in intangible, digital form, and distributed via electronic networks). In an active sense, *to superdistribute* means the combined transaction of acquiring a good and its (offering for) re-distribution, or resale, and actually transferring it to another node.

Here we argue that existing system models for DRM are too narrow to accommodate for the specific features and structures of superdistribution. In fact, extending DRM into various directions is a recent research trend, which is triggered by the manifold ways in which users operate with digital goods for instance in social networks. For instance, the authors of [14] transcend DRM by envisioning a system in which only the information on “who owns this digital good” is managed and thus agents in the economic network can be given ample freedom, e.g., to superdistribute it. In this section, we present

a similar approach to extend information management systems in an appropriate way for superdistribution.

### A. Superdistribution networks

A superdistribution network in the most general sense has two sides. The first one is the network over which the good is distributed, economically a logistics network for the final distribution of the good to the consumer. If it is an electronic network, it is a particular kind of a content distribution network, like Akamai, Amazon S3, Corel, CD-Networks, etc. Whether a good is distributed by ordinary mail, over an electronic network, or by short-range communication between mobile devices, is immaterial for the classification as a superdistribution network. Paradigm examples exist for all three variants: The classic chain letter in the first, peer-to-peer networks in the second, and superdistribution between mobile devices as for instance standardised by OMA in the last case. In all cases, superdistribution is an overlay over an (often general-purpose) communication or transportation network, like ordinary mail, the Internet, or Bluetooth ad hoc communication between mobile devices. We call this side of a superdistribution network the *content distribution overlay (CDO)*. The CDO is a directed graph, which in most (reasonable) cases may be assumed to be a connected tree. The CDO graph can be coloured, i.e., various attributes may be attached to the edges, a particular example being that the quality of the good may change, e.g., improved by a superdistributing node to compete with other resellers.

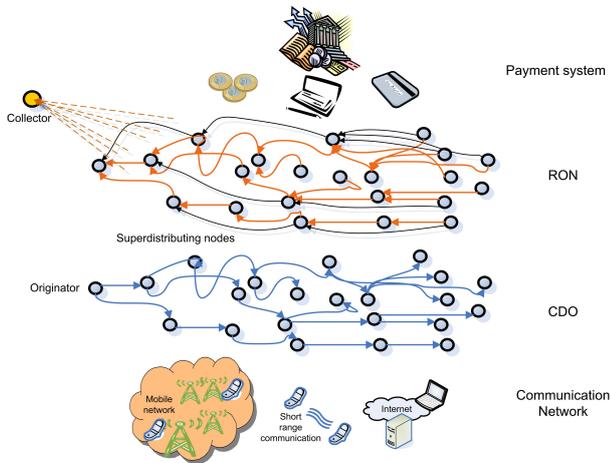


Fig. 1. Superdistribution overlay networks in the system context.

Superdistributing nodes in a CDO need a good, economic reason to participate. This is always true due to the minimum marginal cost greater than zero incurred by a superdistributing node for storage and transfer of the good to and from him-/herself (one of the two at least is borne by a specific node). That is, nodes expect some kind of remuneration for participating actively in the CDO — otherwise they may just become sinks for the digital good. The flow of remuneration — pecuniary, informational, immaterial, or of any other conceivable kind — constitutes another overlay network, the

*remuneration overlay network (RON)*. The claim here is that no superdistribution network exists without RON, the most trivial example being the tree spanned by the resale prices paid by buyers to superdistributing nodes in the CDO. In this case the edges of the RON are just the edges of the CDO with inverted directions (and different colours, e.g., the sales price, attached). The node-set of the RON can be assumed to be a subset of the node-set of the CDO, but the relation of the RON's edges to the edges of the CDO is generally nontrivial. For instance in multi-level marketing, a buyer of a good might pay a reward to resellers further down the line, and not only the resale price to his direct reseller. Figure 1 shows CDO and RON in the context of underlying communication and payment networks.

### B. Digital goods

The term digital good used so far refers to the economical atom distributed over the CDO and being the root cause for the RON. Informationally, the digital good is a compound minimally consisting of three components.

The *content* is the piece of digital information that is actually used and, if the node chooses to do so, offered for distribution to others. As the superdistribution network is an economic market mechanism, the content is necessarily accompanied by information representing the contractual rules of a) the global superdistribution market, and b) the particular relationship between superdistributing (reseller) and acquiring (buyer) node. Though we will not make use of this distinction of local and global contract, this orthogonal categorisation may be useful, e.g., to classify superdistribution networks.

Using the good means, on the one hand, that the content is *consumed* by a node who acquires it. Consumption of the content represents one part of the value proposition that the digital good represents to a buyer. It is governed by a piece of information commonly called the *consumption licence*, which describes the conditions and permissions under which the buyer can use the content. Economically speaking, the consumption licence prescribes the ways in which a buyer may turn the value proposition of the content into utility. The consumption licence is also thought to be the informational link between the digital good and the remuneration overlay by stating the rules of payment for the good to the superdistributing node, as well as any other reward to be paid to further nodes or entities. In this way the consumption licence generates the RON from the CDO, assuming the rules are adhered to by all participants. Summarising, the consumption licence consists of three parts:

- *Consumption rules* describe how content may be used;
- *Remuneration rules* describe how and who must be paid for it;
- The *Content association* describes to which content the rules apply.

The second way in which an acquiring node can make use of the good is by superdistribution. We think of it as governed by rules incorporated in a second licence, the *redistribution licence*. Just as the consumption licence connects the good to

the RON, the redistribution licence conditions, or generates the content distribution overlay. Thus, this licence consists of two essential parts:

- *Redistribution rules* describe how, to whom and under which conditions content may be redistributed;
- The *Content association* describes to which content the rules apply.

The complete informational structure and its relation to CDO and RON is visualised in Figure 2

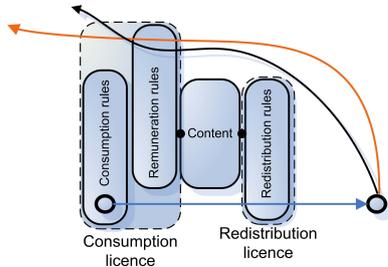


Fig. 2. Information model of superdistribution.

Of course, many other groupings of the information characterising a superdistribution network are possible — the approach chosen here is lead by the distinction between CDO and RON. It should also be noted that all notions introduced above are understood here in the broadest possible sense. That is large parts of the rules and licences may be represented differently than in digital form and may include for instance general legislation, copyright law, social norms, etc. Redistribution in particular can also be governed by technical conditions, e.g., the information system that represents the platform for the execution of superdistribution.

Thus the particular rules that need to be represented digitally in a concrete superdistribution network may be restrictions as well as extensions of such global, or external, rules. Likewise, content associations may be simple titles, digital identifiers denoting a single piece of content or a group, or be augmented by information protecting the integrity of digital content such as hash values or signatures. Nothing restricts the methods by which the licences and the content are generated, stored, and transferred in the superdistribution network. This conceptual approach is well known from general DRM [8].

### C. Examples

Some more concrete examples might elucidate the abstract notions of Section II-B. The most direct form of remuneration is a resale price paid by the acquiring node to the superdistributing node. This makes the superdistribution network a genuine *network market* of buyers/resellers, where an incentive to buy a good accrues to them by the resale revenues they can achieve. The “multi” in the term *multi-level marketing* often refers to the fact that many subsequent levels or generations of buyers contribute to a node’s resale revenues, or even all of them. This kind of payments or remunerations from the down-line may be restricted to a finite number of buyer generations

or not, the latter case being realised in some network marketing schemes for physical goods.

The remunerations may be conditioned by various global or individual factors such as time, buyer/reseller location, distance in a social network, or externalities like a measured popularity of the content. In many cases it makes sense to let a part of the resale price accrue to a central entity external to the CDO proper, which we call *collector*. Its role may be to skim revenues from the market for, e.g., the artists and or labels, or it may act as a (state) collecting agency implementing a taxation on the distribution of digital goods. Examples for second-level payments and the role of the collector are shown in Figure 1.

An interesting example for restrictions on the redistribution is the implementation of territorial protection of some sort. This can be used to protect resellers from the competition of their (direct) buyers to a certain extent buy stating, e.g., “do not superdistribute before moving away by 100 metres”. Thus, this kind of redistribution rule using restrictions based on geographical location may make particular sense for CDO based short-range communication between mobile users, i.e., mobile superdistribution. We showed in [15] how such conditions can be enforced in an efficient, de-central, yet secure manner.

## III. SOME EXAMPLES

As said, superdistribution networks occupy only a small niche even of the online content distribution market. The better known examples are the following. Snocap [16], founded by one of the fathers of Napster, was started with the idea to obtain licences from the music industry which explicitly allow to distribute content over the existing, popular p2p networks. Snocap uses audio fingerprinting to track the distribution of content, and file-sharing networks need to be adapted to support Snocap’s remuneration scheme. Though SnoCap has made some deals with many, even major, labels, it never took off economically and the company has been acquired in February 2008 by the social networking platform imeem [17]. After restructuring and changing the strategy, Snocap has become a general service provider for online music distribution and for instance provides the technology for the music stores in MySpace. MashBoxx [18] started with similar ambitions and also close to the circles of Napster and Grokster. The company seems lay dormant for some time, appearing in the news only for recent intellectual property litigations [19]. Peer Impact is a pay-for-download file-sharing service created by Wurd Media, and now acquired together with its parent company by the online video service provider Roo [20]. The file-sharing client has now been re-released under the new brand name ToPeer [21], which seems to use part of the original technology to allow p2p users to create private spaces in which to share content with peers they trust. In the following we describe two particular examples in more detail. They are chosen because they represent true technical superdistribution systems, and their systems are better documented. The two systems represent to some extent opposite extremes for superdistribution with respect to (de-)centralisation.

## A. Potato System

The Potato system [22] is a product developed by the 4FO AG [23] (founded in 2000) together with the Fraunhofer Institute for Digital Media Technology IDMT [24] in Ilmenau, Germany, for superdistribution of music as mp3-files. The technical platform for superdistribution presented by the Potato system is centralised, insofar as it uses a central accounting service (AS) for registration and publishing new songs by originators, and to operate the remuneration scheme. The content CDO is completely free of any DRM measure, the only information protected by the AS (besides the content integrity of which is proved by a hash value) is the redistribution licence, which is obtained by a buyer upon payment in the form of a transaction number (TAN). The TAN serves as a receipt which is simply added to the file name, which is in turn announced in subsequent resales to the AS which initiates the rewarding of resellers. Some details are found in [25], [26]. Potato supports various payment providers from which the originators of a good may choose.

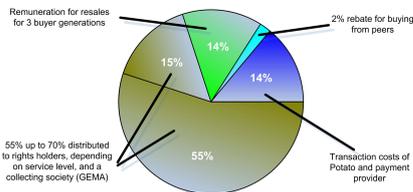


Fig. 3. Revenue sharing in the Potato system.

The market mechanism and remuneration scheme implemented in the Potato system is perhaps the most evolved in superdistribution. The sharing of revenues is shown in Figure 3. Potato targets small labels and independent artists, who may obtain 55–70% of the purchase price of every resale, depending on the service level they choose. An interesting detail is that Potato has an agreement with the German collecting society for music, GEMA which obtains the due contributions directly from the system. Potato itself and the payment provider share 14% of the purchase price and further 14% are distributed as resale revenues from the buyer to resellers (this share has been decreased from 35% in “Version 1.0” to the current “Version 2.0” value). The special kind of remuneration for resellers in this system establishes a true multi-level market with three rewarding levels, each being awarded a geometrically decreasing share of 10, 3, and 1%, respectively, cf. [10, Section II.B]. Thus the CDO and RON look locally as shown in Figure 4. It is interesting to note that a rebate of 2% (borne by the system, not the resellers) is offered for nodes who choose to buy from a peer rather than the central service. This is an important incentive that reduces the dominant role of a single market participant, cf. Section IV-B<sup>1</sup>.

Originally resellers were mostly left to their own devices in marketing songs for resale. They could use a resale link containing their TAN on their Web-site or in e-mails. The

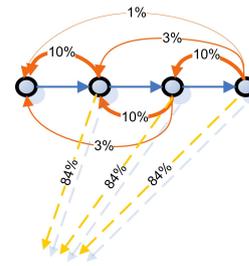


Fig. 4. CDO and RON of Potato connect 4 buyer generations.

most recent developments of the Potato as a superdistribution platform regard capabilities to support users in marketing goods, i.e., means to offer them successfully online for superdistribution, and to compete with other resellers. This includes the extension of resale links to Widgets embodying small online shops where resellers can display their favourites, covers, and let peers listen to clippings of songs. 4FO also added a social commerce platform SpreadBox [27] to its portfolio which also tries to leverage community aspects of marketing in the form of product recommendation.

## B. DRM Paradiso

The Paradiso system [28] is a technological solution to DRM-based superdistribution proposed by Nair Srijith from the research group of Andrew Tannenbaum [29], and others. Its central technical trait is that it relies on a *trusted platform* [30] to ensure adherence to consumption and redistribution licence. Thus it makes some requirements on *compliant devices* with regard to cryptographic capabilities (hash, AES engine, and PKI management), secure storage, and secure content decoder.

In the content distribution scheme of Paradiso, consumption and remuneration licences are cryptographically bound to the content and *chained*. That is, a buyer receives with the content a signed container from the reseller, containing all previous licences created in every resale upstream in the CDO. The signature also associates this data to the content. This enables him, e.g., to verify that the content has not been tampered with, for instance it prevents content masquerading attacks by which a reseller might try to superdistribute content of lower quality. The compliant device can also check that all licence rules have been enforced in all previous distribution steps, and enforces the applicable rules for itself, e.g., respects and updates the allowed number of resales. Payment is an out-of-band process in Paradiso which is based on a receipt: the acquiring node sends back to the superdistributing node. It is not hard to see that this system has strong security with respect to the maintenance of DRM of the content as it is distributed down the CDO. Formal security proofs are given in [31].

This system provides the strongest possible DRM enforcement in superdistribution which can be implemented in a completely decentralised fashion. The system has not been deployed commercially, yet a prototype has been shown on a Neuros development board [32] with similar capabilities of what is typical for mobile music players (TI 200-MHz

<sup>1</sup>The present author takes the liberty to claim certain credit for suggesting some of these novel concepts.

ARM926, 120-MHz C54x DSP processor, 64 Mbytes of SDRAM and 10/100 Mbps Ethernet port, etc.). The board runs a modified version of the Linux 2.6 kernel. Based on OpenSSL libraries for cryptographic support, the higher cryptographic and security functions, are emulated by a software layer.

#### IV. CONDITIONS FOR VIABLE SUPERDISTRIBUTION

At first sight, superdistribution seems a variant of DRM or p2p, or a combination of both. Now we try to elaborate on specific traits to show how superdistribution is different.

##### A. The axis of lawfulness and legitimacy

The RON, if effective, turns superdistribution into a network marketing scheme, or if multiple buyer generations receive remunerations, a multi-level marketing scheme. Multi-level marketing carries negative connotations and is illegal in special forms known as pyramid selling, snowball systems, chain-letters, etc., under many jurisdictions. This similarity to illicit schemes has perhaps also impeded applied research in the field of superdistribution as such. [33, Vol. II] present criteria to distinguish between legitimate multi-level marketing and such practises that are to be considered illicit. In the case of digital goods some arguments speak for the viability of fair superdistribution schemes (thoroughly discussed in [34], [35]).

- i) Buyers acquire not only a void right to resale, but also a good of value. Potential losses an agent entering at a late stage will incur are charged up against this value;
- ii) *Inventory loading*, i.e., the obligation to keep a large, non-returnable stock, is irrelevant for digital goods;
- iii) Marginal costs for replication and redistribution are mostly much smaller than resale prices and thus transaction costs are largely insignificant;
- iv) A main novel feature of the concepts above is that they enable in principle a fair system design (see below).

Other legal requirements for superdistribution are derived from the corresponding ones for general electronic commerce.

- i) privacy of buyers and sellers should be maintained by implementing minimal-need-to-know principles;
- ii) Consumer protection legislation, as, e.g., in the EU [36], needs to be respected;
- iii) Copyright law must be respected, i.e., originators rights must be properly transcribed into the licences and a system's operator must obtain all necessary rights and involve collecting societies, etc.
- iv) Contracts between buyers and resellers must be enforceable and individual fraud (e.g., by selling content of lower value than proposed) must be prevented;
- v) Market abuse and distortion must be prevented, cf. the economical and security requirements below.

##### B. The economical axis

Digital goods share the properties of information goods which are transferable and non-rival like public goods, and additionally are durable, i.e., show no wear out by usage or time [11], [12]. Like for a private good, however, original creation can be costly, whereas reproduction and redistribution are potentially very cheap. This is the economical basis for superdistribution which emulates the distribution system of free-riders, namely p2p networks [37]. They pose additional

value proposition to buyers of the original (legal) version of the good by revenues or other rewards linked to resales. Thus the central question for superdistribution of digital goods is economic viability in the presence of free-riders.

The RON of a superdistribution network is a network marketing scheme. Theoretical treatments for network markets are scarce, which inspired us to devise a stochastic model for the dynamics of such markets in [34] and evaluate it in various ways [10], [35]. The model is essentially comprised of atomic agents entering the market *continuously* until saturation, with equal chance to trade with each other, i.e., to buy the good from a reseller. With these assumptions, a node entering the CDO at a certain point in time, i.e., a certain market saturation, can calculate its *expected* revenues from subsequent resales, given that the *price schedule* of current and future resale prices is known. Figure 5 shows two examples (black, blue) of prices (dashed), expected resale revenues (thin solid) and effective prices, i.e., price paid minus expected revenues (thick solid), plotted against the saturation parameter running from 0 to 1. The thrilling flip side of the innocuous mathematical expressions defining this model is that it enables *dynamical forward pricing*. That is, the operator of a superdistribution network can in principle control the incentive that accrues to buyers via the resale revenues over time. This possibility has not been exploited by any superdistribution schemes yet.

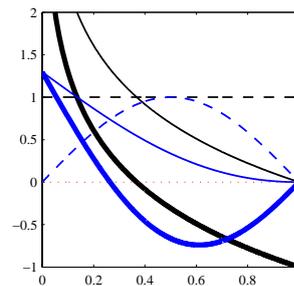


Fig. 5. Examples for expected revenues from resales and effective price in random superdistribution with dynamical forward pricing.

Further results model's analysis spark optimism for superdistribution as a business and its viability as a replacement for DRM. In a basic extension of the model it was shown in [10] that the legitimate good in the CDO can prevail against a free-rider version under moderate assumptions. Nonetheless, superdistribution market mechanisms need to be carefully crafted as many more external factors other than rational decision-making based on pecuniary incentives come into play. One important aspect in that vein is market homogeneity. While superdistribution will work fine in a population which consists of a rather homogeneous group of individuals, for instance with special preferences, it may break down if the market is biased in the sense that there is a group of agents with higher trading capacities, e.g., large music labels running direct sale web sites. Furthermore, inhomogeneities amplified by network effects [38]–[42] carry the imminent danger that the market can be cannibalised at an early stage by an agent

with overwhelmingly high communication capacity, e.g., a popular web site, who could then obtain a practical monopoly.

Finally, there is a psychological element to superdistribution that is connected to the aleatory element of network markets and human sense of justice, which modern empirical economics has shown to be an important driving force of human action [43]. In the small-scale study on a real superdistribution system [44], it was shown that users felt bad about the monetary incentive they received from resales since they were asking money from their peers for something that was perceived as pure entertainment. Though these results may be culture-dependent to some extent, they show that the marketing aspects of superdistribution deserve utmost care.

### C. The security and technical axis

From a security viewpoint the central difference between DRM and superdistribution is that DRM protection is focused entirely on the CDO, while in superdistribution the most important protection goals regard the remuneration. In fact, the parts of superdistribution which require local DRM protection in and between the nodes are encoded in the consumption rules of the consumption licence and the redistribution rules. The latter are essential to protect the business model and market mechanism implemented by the superdistribution system's operator. These CDO protection requirements can be implemented by arbitrary DRM measures, centralised or decentralised and with a varied level of enforcement, as we have seen in the examples of Section III. An important point for the buyer is the secure association to the content to prevent the mentioned content masquerading. On the other hand, ensuring remuneration is essential to implement a fair superdistribution market. A natural way to combine the in-band with the necessary out-of-band processes, e.g., payment, is by sending back receipts, which are cryptographically bound to the content and transaction, to the reseller. The reseller can then for instance redeem these receipts as tickets at a central rewarding service. We have shown a way to implement such general schemes with trusted platforms in [45].

Privacy is of utmost importance in a network of transactions involving a large number of partners. In superdistribution privacy is limited again essentially in the remuneration process, since there buyer and reseller need to reveal their identities and transaction data toward a payment provider or transaction processing service. This is not a gross risk to privacy, since often buyers and resellers are acquainted anyway, for instance if superdistribution is based on personal recommendation. In general, the identities of nodes in the RON should be protected by Identity Management systems [46], [47] to the appropriate level. The Paradiso system described in Section III-B exhibits the usual trade-off between security and privacy. The chain of licences transported downstream in the CDO contains information (though not necessarily personalised) on every superdistribution transaction on a path. It would be interesting to see if security can be protected with similar strength but with higher privacy levels. Methods for that can for instance make use of cryptographic zero-knowledge proofs [48], [49].

Superdistribution as such is almost technology-neutral. Three challenges need to be met for their success in the economy of digital goods:

*Market mechanisms* must be implementable in a general superdistribution framework or platform. Such a framework should enable the definition of CDO and RON structures, for instance rewarding levels, match-making rules, allowed number of resales, or the more concrete rules some of which have been mentioned in Section II-C.

A *marketing platform* must be incorporated in the superdistribution network, in particular to ensure fairness in trade and competition between resellers, and market homogeneity.

The *dynamisation* of the market should be supported. This regards local changes in space and/or time of the two licences, of which perhaps the most important example is dynamical forward pricing. A related research challenge is to devise methods to monitor the market in real time. This would for instance be useful to furnish up-to-date information on the popularity of a piece of content.

As an example, the digital good could be made returnable to the originator or the reseller if the chances to achieve further resales revenues becomes to low.

## V. SOME REFLECTIONS ON COPYRIGHT PROTECTION, USER-GENERATED CONTENT, AND FREE RIDING

What is the relationship between superdistribution and copyright protection? Most existing superdistribution systems use copyright protection on the content, thus raising all well-known questions of fair use. In those systems, superdistribution is just another marketing scheme for copyright-protected content. One exception is the Potato system which deliberately refrains from applying copyright protection on the content and therefore represents a true alternative to rigid DRM. As was shown theoretically in previous work, DRM-free superdistribution can in fact be economically viable even in the presence of free riders due to the incentives provided to legitimate resellers in the network marketing scheme implemented via the remuneration overlay, cf. Section IV-B. Thus, the data that needs the strongest protection in superdistribution is the redistribution licence, not the consumption licence nor the content itself, as we found out in Section IV-C.

Nevertheless, technical copyright protection is the prevalent method used in the marketing of digital goods, and centralised distribution is dominant. So it is interesting to reflect on the ongoing "battle" between copyright holders and "pirates" to see what role superdistribution of digital content may play in the future. So, free-riders are fought by technical methods for copyright protection and accompanying legal regulation [50]–[52], which, generally speaking, aim at restoring features of private, physical goods. None of this has lead to sustainable success and economic, legal, and societal implications of rigid DRM raised a heated debate about its various fundamental, economic, and pragmatic problems [8], cf. [53] for a more general discussion of the underlying concepts of intellectual property rights. The general legitimacy of DRM measures which tend to disrupt consumers' expectations on

their individual usage of the good [54], is doubtful in light of empirical findings on the effect of illegal file-sharing on record sales [55], which seems negligible.

Some industry players “defect from the front”, for instance iTunes now offers media from major label EMI with superior quality and free of copy protection, using the absence of DRM as a means of quality discrimination [56]. Exponents of the computer and media industries issued statements raising doubts on the viability of DRM for media marketing [57], [58]. On the other hand recent court cases had a mixed outcome for both sides, sometimes awarding (punitive) damages to copyright holders, sometimes questioning the legitimacy of the case as such. Nevertheless the legal lever of copyright holders is becoming unprecedentedly long. In an unfortunate turn of affairs of historic dimension this is associated with novel legislation on lawful interception and mandatory data retention in telecommunication meant to protect societies from serious organised crime and terrorism. The pressure of the industries’ lobbyists is now on ISPs to filter copyrighted content and block users even on the mere suspicion of infringement. This approach has failed in the first attempt to push it through at the European Parliament’s cultural commission [59], and the Commissioner for the Internal Market has rejected the implementation of EU policies in that direction [60]. Nonetheless, France has enacted legislation to bar users from the Internet as penalty for copyright violations [61]. The demands go so far as to “outlaw” and completely filter p2p protocols [62], as they are mostly used for “piracy”<sup>2</sup>.

As Lawrence Lessig states in his insightful talk [63], “there is growing extremism that comes from both sides in this debate [...]”. On the one side, a abolitionist attitude toward new technology which for instance automatically removes copyrighted content from sites like YouTube, regardless whether there might be a claim of fair use to it or not. On the other side a growing disrespect among the youth for the concept of intellectual property as such, and even for the law in general. User-generated content relying on original content, such as “remixes” found frequently on the Web are a good example of new forms of creativity that may be thwarted in such a hostile environment. The implications go beyond digital goods and could impact the whole way the Internet is used, as every move in it by a law-abiding citizen or his children bears incalculable risk of being incriminated. In such a situation there is in fact little reason for copyright holders to experiment with alternatives to centralised content distribution protected by DRM, civil, and penal law. Culture would be “read-only” as Lessig phrases it. Making the historical analogy to the advent of broadcasting technology in the US in the 1930s, Lessig describes how the then ruling cartel ASCAP that controlled most of the performance rights nearly strangled the new media by charging broadcasters inflationary prices. This worked until in 1939 Broadcast Music Incorporated (BMI) was founded. BMI was a content aggregator organised much more democrat-

<sup>2</sup>With this rationale, SMTP should be outlawed, as the overwhelming proportion of e-mail is SPAM.

ically and providing its subscribers for instance with bundles of musical works from the public domain at economic prices. In the early 1940s most broadcasters switched to BMI. ASCAP countered with content quality arguments that are resounding in the current DRM debate as well. Nevertheless ASCAP cracked in 1941 and the bottom line is that competition alone was enough to break a legal cartel over access to content. Thus emerges the strongest argument against the advent of the read-only culture. There can be an economic balance between copyright holders and consumers and it can be struck by the counterweight represented by community-produced, user-generated content such as remixes and mashups.

In view of all this and with hindsight to history, superdistribution and particularly network markets for digital goods could be a part of the economic counterweight necessary to strike the mentioned balance. As the Web is evolving now to the Web 2.0 where user-generated content and communities gain an increasing importance, two germ ideas could be followed that might raise the economic impact of superdistribution. First, an open superdistribution platform can be envisaged on which everyone can set up his own market mechanism for his own content. Second, in a given superdistribution system, resellers could be explicitly allowed and even encouraged to create derivative works of the original content they superdistribute to become value-added resellers. Both ideas enable resellers in a CDN to differentiate themselves from each other. This helps to provide an equal opportunity market for all participants and make it more homogeneous.

## VI. CONCLUSION

The main claim of the present paper is that superdistribution is conceptually different from both DRM and p2p and is really a third field in its own right. In fact we have shown that the system theoretic content of superdistribution is much richer than that of DRM systems, as it uses for the first time — and by necessity — informational representations for the value proposition of a digital good to its buyers, i.e., the combination of consumption and remuneration for resales. Moreover the economy of superdistribution lies on a categorically different level than the economy of p2p networks, which is centred on questions of incentives for participation and fairness in the contribution of resources [64], rather than transported values.

We conclude that the evolution of superdistribution based business models for digital goods is still in its early beginnings — and though the risks are considerable, the prospects are equally thrilling. As a research subject, superdistribution can be really attractive since it is interdisciplinary by nature and at the same time has a clearly defined field of experiment in the digital economy.

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