Brief Description: This use case describes the basic logic for single intersection ba
vehicle priority (preemption) with multiple vehicles

Primary Actor: Emergency Vehicle

Secondary Actors: Traffic Signal Controller

Precondition:

1. Emergency Vehicle is in Active Response Mode
2. The traffic signal controllers are programmed with a variety of priority
   such as early green and green extension or the traffic signal controlle
   intelligent algorithm for providing priority signal timing for priority requ

Main Flow:

a. The use case begins when any one of the Equipped Emergency
   enters the radio range of an RSE.
b. The following steps occur for each EV that approaches the inters
   i. The OBE receives MAP and SPaT messages from the R
   ii. The RSE receives Basic Safety Messages (BSMs) from t
   iii. The OBE computes the estimated arrival time (min,max)
   movement (inlane, outlane) as available.
   iv. The OBE determine the eligibility for priority and establish
   level of priority.
   v. The OBE sends a Signal Request Message (SRM) to the
   vi. The RSE determines the appropriate traffic signal phase
   vehicle (translates SRM data into a phase request).
   vii. The RSE determines which SRMs (from multiple vehicles
   (Priority ranking? Or maximum number).
   viii. The RSE notifies the traffic signal controller (or logic) of t
   requests including desired phase and service time.
   ix. The RSE transmits a status message (SSM) with informa
   which requests will be served (feedback to the vehicle).
c. The RSE updates the vehicles served performance measures.
d. The use case ends.

Post Condition:

1. The EVs safely cross the stop bar.

Alternative Flow:

1. (iii.) The OBE updates the SRM with new arrival information based or
   speed or route change.
2. (iv) If the OBE determines that the vehicle is not eligible for priority, th
   ends and the EV operates as any normal vehicle.
3. Interrupt ±An emergency vehicle may terminate its emergency status
   The OBE will send an SRM cancel service request.

Comments:

			who has arrived on scene (the way they ca some incidents to know very quickly and rel office).
5.2			EVP - Priority Contention
5.2.1			Vehicle class/type, incident location and typ will help the traffic control decide whether to yes, which EV to give priority to.
5.2.2			Mostly vehicle type, ability to stop, and prec should be considered in determining priority
5.2.3			Vehicle type versus class of emergency bei considered in determining priority.
5.2.4			EMTs first, followed by Fire should be cons priority.
5.2.5			Link priority decision to data from emergenc level of the emergency response (e.g., fire v tree).
5.2.6		11.0 9.3.4 9.3.5	There must basically be an off-line discussi region needs to establish a priority scheme vehicles - but vehicle and mission) so that t place at a higher level and even alternate ro required. EVP is not just a localized proble for routes!
5.2.7			Priority contention for several requesting ve adherence to predicted route.
5.3			EVP - Performance Me asures and Goals
5.3.1		12.7.5	Response time improvement.
5.3.2		12.7.5	Reduction in response time (2)
5.3.3			Improved system recovery from preemption
5.3.4			Accessibility measures -- how far can a sing home base, reliably across the network with threshold?
5.3.5		12.7.5	Reduced accident of EVP actions at interse measure. We already have EVP and route waves, etc. About the only benefit that cou other vehicles away from the area. How do
5.3.6			I think people are being far too optimistic or
5.3.7			Not all response vehicles arrive at the same they come/leave at the same speed or stag IEEE work for some concept to perhaps ste

environment. The chief concern is whether there has been any attempt by the international community to fulfill the three fundamental obligations. It must be emphasized that fulfillment of these Part XII obligations may be as onerous as it is crucial. Frequently, substantial fulfillment of the Part XII obligations may demand high economic and political cost. Of course, it is beyond the capacity of this article to examine accurately how far States have gone to fulfill these clear environmental law obligations at the national level. In fact, this type of examination has, so far, never been undertaken. There is, nonetheless, ample evidence of a considerably raised environmental consciousness throughout the world. This has, in turn, been reflected in legislative action. Also, there is no doubt that this raised consciousness and legislative action has been stimulated and encouraged by the law of the sea debate since the late 1960s. Thus, the history of the modern law of the sea also reflects, to a great extent, the development of the environmental law of the sea.[63]

It can be seen that, at the national level, the implementation of the environmental law of the sea has been far from methodical. Generally, environmental legislation has been developed on an *ad hoc* basis, often in reaction to some type of specific environmental problem rather than in compliance with the environmental policy evidenced in conventions and agreements. However, it must be remembered that a high level global environmental directive was missing until the conclusion of the 1982 Convention. This means that the development of international environmental law had been subject to a "patchwork" regime without an all embracing legislative umbrella. This is also reflected in the difficulties experienced by such organizations as the International Maritime Organization (IMO) and the United Nations Environment Program (UNEP) in having their agreements widely accepted and implemented. The highest level global "directive" had simply been missing!

Most of the existing conventions illustrate the scope of the general acceptance of the global marine environmental regime, but a number of them are not yet in force due to lack of sufficient acceptance. Furthermore, many of the instruments which are in effect have not been accepted by a majority of States. Some have barely received the minimum acceptance required to enter into effect. This illustrates a real gap in the "numbers game" — the number of States demonstrating their commitment to the environmental law principles espoused by the various instruments. In a world of approximately 160 States, one could argue that acceptance of such principles requires adherence by at least seventy-five to eighty-five percent of *all* States.

Examination of the agreements indicates that, while there has been

63 THE ENVIRONMENTAL LAW OF THE SEA, *supra* note 4.

acknowledgement of the obligation and various attempts to cooperate on a regional basis, there has been far less activity regarding implementation and development of acceptable international rules and standards. As discussed previously, States' obligations to implement and enforce these rules assume the preexistence of relevant international rules. This problem derives partly from the historically *ad hoc* approach by which various agencies and groups, such as GESAMP, IMO, UNESCO, UNEP, IAEA, FAO, and other interests, such as the OECD, EEC, and the IUCN, have developed overlapping programs in response to marine pollution or have developed responses which are not necessarily compatible. There is a clear need for better information exchange and greater coordination of efforts among the various bodies and States acting on their obligations. Presently, it is difficult to ascertain the status of existing conventions or arrangements, particularly where various protocols have been developed. It is also important to note, that many of the conventions in existence today groups were conceived and developed before the 1982 Convention became the dominant force.

Again, vessel activity today is not the major source of marine pollution, even though it has been the focus of most international responses. The major source of marine pollution is land based activity. Recent activities such as the EEC Directives, the development of the Montreal Guidelines, the failed Declaration of the Baltic States, the increasingly broad bilateral agreements, the environmental treaties relating to the South Pacific and others illustrate that States are recognizing the impact of land based pollution and are attempting to respond cooperatively. Nonetheless, this is a complicated issue both from a legislative and an enforcement point of view. While land based sources of pollution may be more easily addressed at a regional level, there is clearly a need for global regulation and standards to achieve the required "legal order" under the 1982 Convention. However, aside from a few agreements which predate the 1982 Convention, little has been done in terms of creating international law and implementing those standards nationally. The status of the Montreal Guidelines is uncertain; consequently, determining whether these constitute "international rules" or regional cooperation is problematic.

Pollution stemming from ships has received the bulk of international marine development attention since the mid-1950s. The fact that at least forty of the almost sixty conventions and agreements examined for this study relate to shipping activities illustrates this point. Although it is argued that this preoccupation with a single polluting industry has been at the expense of more international energy being concentrated on land based pollution, there is no doubt that it has resulted in the reduction of

ship-source pollution to nearly the lowest possible level.[64] This is principally due to the work of the IMO which, through its principle of "safer ships and cleaner seas," has effectively convinced maritime states and their shipping industries that maritime safety and environmental protection can be combined for direct global economic benefit.

Nevertheless, ship-source pollution continues to be a problem. For example, the MARPOL Convention,[65] one of the most innovative and far-reaching marine pollution instruments conceived so far, a precedent for regulating other polluting industries, has not yet been as widely accepted as it should be. Furthermore, the primary concentration in the area of ship-source pollution has been on oil pollution. Liability for damage arising from pollution by substances other than oil has not yet become the subject of a worldwide convention, but the subject is currently being studied by the IMO following a failed attempt in 1984.

The London Dumping Convention of 1972 was one of the more comprehensive pre-1982 Convention responses to marine pollution from a source which involved both vessels and land based activity. Like MARPOL, it contains supplementary amendments and resolutions, some of which are not yet in force or are voluntary such as the Moratorium on Dumping of Radioactive Wastes. Furthermore, the degree to which States have accepted and implemented all of these standards varies considerably and, consequently, poses a problem for determining the international rules on dumping.

Aside from the problem of State implementation of global and regional conventions and agreements, the 1982 Convention poses a specific problem itself. Although its provisions are designed to create an effective regime or legal order for the protection and preservation of the marine environment, some of the language used to describe States' obligations may be understood to undermine the structure. The problem lies with the third fundamental obligation: the duty to adopt, implement and enforce national legislation. As pointed out earlier, the obligation is based upon the assumed existence of international rules. However, even aside from the internal inconsistencies between international rules and global rules, this creates a problem of circularity where the only international or global rules are those found in the 1982 Convention which itself assumes the existence of external rules!

A related problem is the varying degree of discretion accorded States in relation to the standards for national legislation. Definitional problems also exist with respect to the second fundamental obligation: the duty to cooperate globally and regionally. There is no definition of

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[64] *See generally, supra*, note 2.

[65] International Convention for the Prevention of Pollution from Ships, Nov. 2, 1973, 12 I.L.M. 1319.

"region" in the Convention, despite a duty to cooperate and develop rules and standards on that basis. Although some assistance is found in articles dealing with semi-enclosed seas and the obligation of bordering States to cooperate,[66] it may be that other criteria for "regions" exist.

Although States recognize their international legal obligation to protect and preserve the marine environment and the importance of cooperation, there are still problems in the coordination of responses and in the degree of those responses at the implementation level. The "legal order" rests upon three fundamental and inseparable obligations; failure to fulfill any of the three may mean ultimate failure of the entire regime.

V. CONCLUSION

The foregoing review of the international legal regime concerning the protection and preservation of the marine environment leads to the following conclusions.

Almost sixty international and regional conventions and agreements are concerned directly or indirectly with the protection and preservation of the marine environment. This series of instruments reflects a considerable ability by the institutions which developed them to reach a resolution, although the instruments are far from comprehensive. Many are not yet in force and of those which are, a number have not been accepted by a substantial majority of States. The instruments concentrate heavily on the area of ship-source marine oil pollution which has been reduced to historically low levels. However, liability for ship-source pollution other than oil, such as that from hazardous and noxious substances, is still missing from the overall regime.

In the area of land based sources of marine pollution, the international regime is still far from complete. Despite UNEP's efforts, the various Regional Seas Programs are developing only slowly and, in some regions, are actually languishing. The difficulty of combatting an international problem, originating from sovereign States, manifests itself most clearly in this area. International attempts to deal with this, the most serious of all pollution problems, generally result only in guidelines or voluntary commitments from States.

Although there is now ample evidence of many States' raised environmental consciousness as reflected in new national environmental legislation, much of this development takes places on an *ad hoc* basis, often only in reaction to a particular environmental problem. This is due to a combination of factors. At present, the 1982 Convention provides the only highest-level global "environmental directive" to States. However, the Convention is not necessarily perceived as an environmental instru-

[66] LAW OF THE SEA, *supra* note 1, arts. 122-23.

ment. Some States still consider there to be no truly global environmental directive urging legislative action at the national level. Another problem is, of course, the economic cost of implementing environmental standards. This is particularly problematic for most developing countries and needs to be addressed, possibly at the U.N. General Assembly level. It is simply unacceptable for any State to be unable to implement basic environmental standards of global benefit, due to economic disabilities.

The review of Part XII of the 1982 Convention, in the context of an international regime for protection and preservation of the marine environment, reveals an extraordinarily rich instrument which, most likely far exceeds the expectations of its drafters. *Part XII can be perceived as the substantive codification of the modern environmental law of the sea and, as such, the much needed highest-level global directive for the protection and preservation of the marine environment.* Indeed, it is the paradigm for all international environmental law.

However, the value of Part XII is presently diluted from two directions. First, as stated the 1982 Convention, it sets out as one of the fundamental environmental obligations: the duty to adopt, implement and enforce national legislation. However, this requirement is based on the assumption that international rules *already* exist. Since the only truly global international rules are those set out in the 1982 Convention itself, the argument is circular. This could easily be overcome by a Resolution of the U.N. General Assembly stating that the 1982 Convention reflects the highest global level of environmental law and other international rules for protection and preservation of the marine environment, established outside of the convention in the various international and regional conventions and agreements, are simply the *operational* international rules required by the Convention.

Second, the present lack of the States' perception that the 1982 Convention is also an important global environmental instrument dilutes the effect of Part VII.[67] It could be argued that it should be *the* single most important global statement in terms of marine environmental protection and preservation. This problem could also be eliminated if the U.N. General Assembly were to address the global environmental problem in terms of the Part XII approach of the 1982 Convention.

The legal framework relating to questions of liability and compensation for environmental damage is likewise not well developed. Only in

[67] This is, to a great extent, due to the preoccupation of States with the sea bed provisions of the Convention which has prevented most of the "Northern" States from accepting the entire Convention. Hopefully, progress at the Preparatory Commission on the Law of the Sea may result in a new surge of ratifications which would, at the same time, permit States to focus more sharply on the benefits of the treaty.

the area of ship-source marine pollution has any type of widely accepted regime been established. Even in this area, there are questions about the adequacy of the compensation limits, the administration of compensation funds and, most importantly, the difficulties in quantifying environmental damage by traditional legal methods. Thus, recent work begun by the International Oceanographic Commission in this area is most welcome. Still, the overall area of compensation and liability clearly contains a considerable gap since it presently is covered only by existing public and private principles of law which form an indistinct "grey" area needing a much clearer definition. Specific private law remedies arising from environmental damage are beyond the scope of the 1982 Convention. Yet, the best regulatory principles are defined in the 1982 Convention, for environmental protection is ineffective unless an acceptable liability and compensation regime is also developed.[68]

Apart from UNEP and IMO, few intergovernmental organizations are coordinating their environmental efforts and priorities. Even with such coordination, a better definition is needed. If the global environment is to be protected, then global approaches must prevail. This is clearly expressed throughout the 1982 Convention, but the method of placing these responsibilities in the relevant global and regional organizations remains in question. For example, the recently concluded United Nations Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention),[69] envisages a dual system of control and liability. Although this may well be an innovative approach, it is questionable whether there has been sufficient, if any, coordination with the IMO. This is especially true where a dual system approach, relating to liability for transporting hazardous and noxious substances, failed in 1984. Apart from the obvious gaps in international legislation already identified, there may be a lack of coordination among States.[70]

Finally, the environmental law of the sea, as reflected and codified in the 1982 Convention, must be the responsibility of the U.N. Office for

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[68] Although a number of widely accepted international oil pollution compensation and liability schemes have been developed under IMO auspices since 1969, recent serious tanker disasters have resulted in overreaction, particularly in the United States. This has caused the United States to engage in unilateral action regarding compensation and liability for oil pollution damage. This action clearly contravenes the spirit of the 1982 Convention while making the complex task of the IMO in this area more difficult. *See* The Oil Pollution Act of 1990, Pub. L. No. 101-380, 104 Stat. 484 (1990).

[69] 28 I.L.M. 649, 661-68 (1989). For a more detailed examination of this and related agreements see M. L. McConnell and J. B. Wooder, "Legal Issues Arising from the Transportation of Dangerous and Hazardous Substances", paper delivered at Canadian Institute Conference on Environmental Law and Negotiation, Halifax, 1990.

[70] It is conceded that this conclusion is based on the observation of general trends rather than on sustained research which is beyond the scope of this article.

Ocean Affairs and the Law of the Sea. If the environmental provisions of the 1982 Convention are raised to the highest level global marine environmental directive, possibly through a U.N. General Assembly Resolution, then such provisions must be "championed" and nurtured by an institution commensurate at this level. If such rules are to be the very apex of international marine environmental law, they cannot be interpreted by U.N. specialized agencies and other institutions alone. They should be housed within an organization which is specifically charged with the implementation of all international environmental law, including the law of the sea.